THE JOURNAL OF THE AMERICAN OSTEOPATHIC ASSOCIATION

Vol. 37, No. 8 | 540 N. Michigan Ave., Chicago, Ill. | April, 1938

PAVILLON CAPRICE — NETHERLAND PLAZA HOTEL
Where the House of Delegates will convene beginning Sunday, July 10, for annual session during Forty-Second A.O.A. Convention at Cincinnati

YOUR MONEY—SAVE IT!

Every member who sends in his check now for his 1938-39 membership saves money for his Association. The cost of statements, envelopes, postage, and labor involved in mailing these notices is considerable. This is saved in the case of those who remit before receiving notices, or on receipt of the first such notice.

Save this money for constructive organization work by sending your check today. Scores have already paid for next year—see Advance Membership Honor Roll (page 371).

NEW!—Gifford's Ophthalmology

Practical Ophthalmology—that is exactly what this *brand new* book is—a book devoted to those *clinical* facts of diagnosis and treatment that are so vitally important in the practice of every physician—specialist and general practitioner alike.

Dr. Gifford has discarded unessentials. He has limited theory. His is a book of causes, symptoms, methods of examination, diagnosis and treatment written in the language of everyday practice.

Dr. Gifford tells you what to look for, how to find it and what it means. You will find full details of manual, instrumental and functional examination. There is a special chapter on *Eye Symptoms in General Diseases* and *44 pages on Refraction*. You are told exactly what therapeutic measures are indicated and then given details of administration. The use of solutions, ointments, irrigations, injections, heat and cold, special diets, surgical measures, etc., are all included. The entire book is beautifully illustrated with many of the pictures in full colors.

JUST OFF PRESS

By Sanford R. Gifford, M.A., M.D., F.A.C.S., Professor of Ophthalmology, Northwestern University Medical School. 492 pages, 249 illustrations including many in color. Cloth, $4.00 net.

W. B. SAUNDERS COMPANY **Philadelphia and London**

Hasten Defense Reactions

With EDWENIL

Polyvalent Deproteinized Non-Toxic
Rapidly-Acting Antigenic

Shorten Infections

It is the last straw that breaks the camel's back.
It is the prolonged toxemia that damages.
It is the complications that make colds, measles, and pertussis dangerous.
It is the time element that counts.

Improve the Outcome

Accentuate the natural responses — Minimize the complications — Shorten the convalescence —

BY ADDING EDWENIL TO USUAL THERAPY

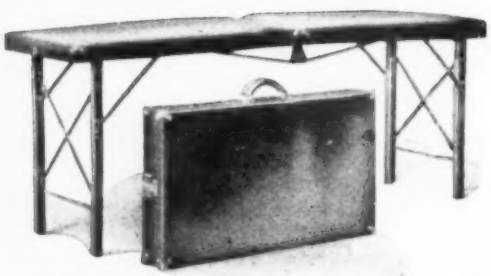
SPICER and COMPANY
GLENDALE, CALIF.

NEW YORK, N. Y. 9 Park Place
CHICAGO, ILL. 1511 Burnham Bldg.
DALLAS, TEX. 834 Allen Bldg.
PORTLAND, ORE. 316 Pittock Block

Every osteopathic physician should own

One or More

Champion Folding Tables



STYLE A—Deluxe model with highest grade materials and finish. Price: $30.00 f.o.b.

STYLE B—Less expensive materials, but strong and durable. Price: $20.00 f.o.b.

Looks like a suit-case when folded. Supports extra weight without sagging. Does not get loose or shaky with use.

The lightest and strongest table of its type on the market. Measures 68 inches in length by 19½ inches in width and weighs 32 pounds.

Upholstered in rich brown Spanish artificial leather. Provided with eight metal corners to protect cover. Has two leather suit-case handles and brass lock and key. Attachment for gynecological work on Style A only.

American Osteopathic Association **540 N. Michigan Ave., Chicago, Ill.**

"A balance of qualities..."

NEW types and varieties of sutures are constantly needed to meet advances in surgery, but the fundamentals of suture dependability remain unchanged.

Sutures still should be not only easy to handle but correct in every phase of behavior. No single feature nor point of merit can accomplish this . . . it demands a *combination* of various qualities.

Therefore, in every new product and in every development by our scientific staff the first concern is a proper ratio of vital characteristics.

The special feature of each product is developed to the highest degree, but always with due regard to other qualities equally essential to correct function.

This policy, which involves the annual consumption of more than 250,000 tubes in experimental work and tests, gives assurance that D & G Sutures invariably possess the correct *balance of qualities.*

D & G Sutures

DAVIS & GECK, INC. • • BROOKLYN, NEW YORK, U. S. A.

Special D&G Sutures

WITH SWAGED-ON ATRAUMATIC NEEDLES

THIS group of products comprises over a hundred suture and needle combinations specially designed for specific procedures, particularly those in which minimized suture trauma and the convenience of needles which cannot possibly become unthreaded, are desirable. A few products from this group are shown on these pages. Full information on others may be obtained from your dealer or by mail from us, upon request.

Intestinal Sutures

KALMERID plain or chromic catgut, celluloid-linen or silk with Atraumatic needles in the several types indicated integrally affixed. Suture lengths: 36 inches for products 1342, 1352, 1372 and 1542; all others 28 inches.

THERMO-FLEX *(non-boilable)*

Plain Catgut:

NO.		NEEDLE	DOZEN
1501	Straight Needle	A-1	$3.60
1503	⅜-Circle Needle	A-3	4.20
1504	Small ½-Circle Needle	A-4	4.20
1505	½-Circle Needle	A-5	4.20

20-Day Chromic Catgut:

1541	Straight Needle	A-1	$3.60
1542	Two Straight Needles	A-1	4.20
1543	⅜-Circle Needle	A-3	4.20
1544	Small ½-Circle Needle	A-4	4.20
1545	½-Circle Needle	A-5	4.20

CLAUSTRO-THERMAL *(boilable)*

Plain Catgut:

1301	Straight Needle	A-1	$3.60
1303	⅜-Circle Needle	A-3	4.20
1304	Small ½-Circle Needle	A-4	4.20
1305	½-Circle Needle	A-5	4.20

20-Day Chromic Catgut:

1341	Straight Needle	A-1	$3.60
1342	Two Straight Needles	A-1	4.20
1343	⅜-Circle Needle	A-3	4.20
1344	Small ½-Circle Needle	A-4	4.20
1345	½-Circle Needle	A-5	4.20

Intestinal Sutures *(cont'd)*

Celluloid-Linen:

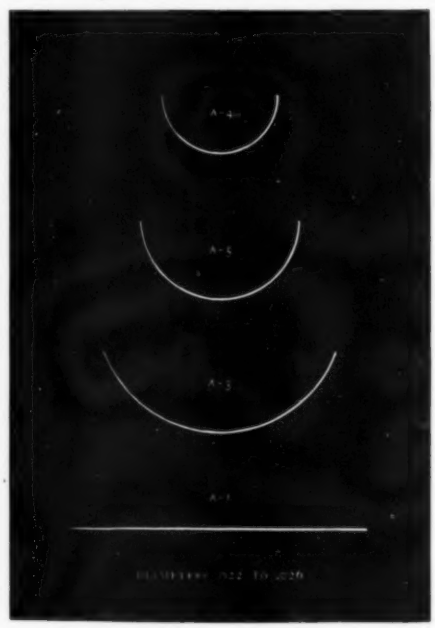
NO.		NEEDLE	DOZEN
1351	Straight Needle*	A-1	$3.60
1352	Two Straight Needles*	A-1	4.20
1354	Small ½-Circle Needle*	A-4	4.20

Black Silk:

1371	Straight Needle*	A-1	$3.60
1372	Two Straight Needles*	A-1	4.20
1374	Small ½-Circle Needle*	A-4	4.20

Sizes: 00..0..1, except *00..0 only

In packages of 12 tubes of a kind and size



Eye Sutures

FINE sizes of plain, 10-day chromic catgut, and black silk with small Atraumatic needles. Suture length 18 inches except as noted. Boilable.

NO.	MATERIAL	SIZE	NEEDLE
1661	Black Silk	6-0	B-3
1663	Plain Catgut	4-0	B-5
1665	Black Silk	6-0	B-1
1665	Black Silk	4-0	B-1
1667	Plain Catgut	3-0	B-4
1669	10-Day Catgut	4-0	B-5
1669	10-Day Catgut	3-0	B-5
1669D	10-Day Catgut †	4-0	B-5
1669D	10-Day Catgut †	3-0	B-5
	DOUBLE ARMED		
1662	Black Silk *	6-0	B-3
1664	Black Silk *	6-0	B-1
1664	Black Silk *	4-0	B-1
1666	Plain Catgut *	3-0	B-4
1668	10-Day Catgut *	4-0	B-5
1668	10-Day Catgut *	3-0	B-5
1668D	10-Day Catgut †	4-0	B-5
1668D	10-Day Catgut †	3-0	B-5

* 12 inches † 9 inches

Package of 12 tubes of a kind $4.20

Cleft Palate and Harelip Sutures

NO.	MATERIAL	SIZE	NEEDLE
1751	Kal-dermic	00	C-1
1752	Aluminum-Bronze Wire	00	C-1
1753	Black Braided Silk	000	C-2
1754	Aluminum-Bronze Wire	00	C-4
1755	Kal-dermic	00	C-3
1758	Aluminum-Bronze Wire	00	C-3

Suture length 18 inches

Package of 12 tubes of a kind $4.20

Thyroid Sutures

THERMO-FLEX (*non-boilable*) or Claustro-Thermal (*boilable*) catgut, and black braided silk with half-circle, taper point Atraumatic needles. Suture length 28 inches.

NO.	MATERIAL	SIZE	NEEDLE
1635	Non-Boilable Plain Catgut	0	T-1
1625	Boilable Plain Catgut	0	T-1
1624	Black Braided Silk	000	T-2

Package of 12 tubes of a kind $4.20

Plastic Sutures

FINE sizes of Kal-dermic; silk and silkworm gut with small, cutting point Atraumatic needles. Suture length 18 inches. Boilable.

NO.	MATERIAL	SIZE	NEEDLE
1651	Kal-dermic	8-0	B-1
1651	Kal-dermic	6-0	B-1
1652	Kal-dermic	8-0	B-5
1652	Kal-dermic	6-0	B-5
1652	Kal-dermic	4-0	B-5
1653	Black Silkworm	4-0	B-1
1655	Kal-dermic	4-0	B-2
1658	Black Silk	4-0	B-2

Package of 12 tubes of a kind $4.20

Other D&G Sutures

SPECIAL needled sutures are also prepared for dental, tonsil, circumcision, obstetrical, ureteral, renal, nerve, artery, and emergency work. These are in addition to our complete line of unneedled sutures embracing catgut, ribbon gut, kangaroo tendons, and a variety of other non-absorbable materials.

DISCOUNTS ON QUANTITIES

Copyright 1938 Davis & Geck, Inc. Printed in U. S. A.

LANFRANCHI OF MILAN, driven from his native city for political reasons, became associated in 1295 with the College de St. Côme in Paris. Here his straightforward style of lecturing and his innovation of bedside instruction soon attracted hundreds of students. Lanfranchi was the first to describe concussion of the brain, and he differentiated between carcinoma and hypertrophy of the female breast. In treating injured nerves he distinguished between longitudinal wounds and complete transverse separation; in the former advising suture of the skin wound only, and in the latter union of the divided nerve with fine sutures.

D&G Sutures

"THIS ONE THING WE DO"

DAVIS & GECK INC.

LIKE TO SAVE $5.00?

Tycos Exchange Plan tells you how and brings you most modern blood pressure equipment with iron-clad guarantee on accuracy and durability

HUNDREDS OF DOCTORS have taken advantage of the Tycos Exchange Plan since it was first offered the medical profession. They've exchanged their old sphygmomanometers (any make, any age) for up-to-date Tycos Mercurials or Aneroids.

You can still take advantage of this Exchange Plan. It is still in effect on the purchase of any of the three instruments shown here. See your surgical supply dealer for full details. He will make it easy for you to profit by the Plan. Taylor Instrument Companies, Rochester, N. Y. Also Toronto, Canada.

TYCOS MERCURIAL. Amazingly durable. Glass tube so reinforced that tests have proved it practically unbreakable. Only mercurial having case GUARANTEED against breakage! 10-Year Guarantee also covers breakage or mechanical failure of any part except inflation system. No time limit on guarantee of accuracy. $27.50 complete.

CERTIFIED TYCOS ANEROID. This Certified Tycos never requires testing. It is guaranteed to be accurate as long as the pointer stands INSIDE any part of the zero oval at bottom of the dial, and to REMAIN ACCURATE IN NORMAL USE. If ever thrown out of adjustment, this Certified Tycos will be readjusted WITHOUT CHARGE for ten years. $25.00 Complete.

DESK-MODEL TYCOS. Smart-looking instrument occupying only four inches of desk space. Easily read at distance of six feet. Carries same 10-Year Guarantee as Portable Tycos Aneroid. Also included under Tycos Exchange Plan. Available as Wall Model by replacing desk base with wall mounting. $27.50 complete.

CERTIFIED *Tycos* INSTRUMENTS
—10-Year Guarantee

CONTENTS, APRIL, 1938

ORIGINAL ARTICLES—
The Basis for Immunity, Natural or Acquired. Charles Hazzard, Ph.B., D.O., New York City....327
Subjective Factors in Skilful Technic. Paul van B. Allen, D.O., Indianapolis....331
The Clinical Classification of Pneumonia. Ralph L. Fischer, D.O., Philadelphia....333
Persistent Suprapubic Urinary Fistula Complicated by Multiple Bladder Calculi and an Associated Diverticulum. Philip A. Witt, D.O., Denver....335
An Essay Toward an Osteopathic Approach to Corrective Speech Problems. Part III. Fleda Margaret Brigham, D.O., South Pasadena, Calif....339
The Three Primary Brain Vesicles and the Three Cranial Vertebrae. Charlotte Weaver, D.O., Akron, Ohio. Part I....345
SURGICAL SUPPLEMENT, AMERICAN COLLEGE OF OSTEOPATHIC SURGEONS—
Editorial: The Urological Specialty. George J. Conley, D.O., Kansas City, Mo....353
Essential Diagnostic Procedures Before Urological Surgery. Edward B. Jones, D.O., Los Angeles....354
Some of the Possible End Results of Urinary Retention. Orel F. Martin, D.O., Boston....358
Transurethral Prostatic Resection Versus Enucleation. Howard E. Lamb, D.O., Denver....361
Fractures of the Neck of the Femur. Part II. Staff of the Lamb Hospital, Denver....364
EDITORIALS—
To Maintain College Enrollment. R. C. McCaughan, D.O., Chicago....367
The Cincinnati Convention....368
Public Health—and Organization....369
Deliberate Misrepresentation....370
Paying in Advance—and Gladly....370
PROPOSED AMENDMENTS TO THE CONSTITUTION AND BY-LAWS....372
DEPARTMENT OF PROFESSIONAL AFFAIRS—
Bureau of Professional Education and Colleges: Curricular Survey....373
DEPARTMENT OF PUBLIC AFFAIRS—
Bureau of Industrial and Institutional Service: Case Reports on Industrial Injuries Due Now....373
Legal and Legislative....373
COMMITTEE ON VOCATIONAL GUIDANCE—
Educate Vocational Counselors. Mary L. Heist, D.O., Kitchener, Ont....377
COMMITTEE ON SPECIAL MEMBERSHIP EFFORT—
Membership Status and Honor Roll. F. A. Gordon, D.O., Marshalltown, Iowa....377
CONVENTIONS NEWS—CINCINNATI....378
LABORATORY PROCEDURES—
Trichinella Spiralis Found in Thick Drop Preparation of Blood. Walter E. Bailey, D.O., and Fridel M. Packard, St. Louis....382
CURRENT OSTEOPATHIC LITERATURE....383
BOOK NOTICES....384
STATE BOARDS....384
CONVENTIONS AND MEETINGS....384

SUBJECT INDEX

Allen, Paul van B.:
Subjective factors in skilful technic....331*
Amendments, proposed, to constitution and by-laws, A.O.A....372
Legal and legislative....373-LL
Bailey, Walter E.:
Trichinella spiralis found in thick drop preparation of blood....382-L
Beckwith, C. G.:
Orthopedic section meetings....380
Bladder calculi and diverticulum [Witt]....335*
Book notices:
The Treatment of Rheumatism. W. S. C. Copeman....384-BN
The American Medical Profession—1783-1850. Henry Burnell Shafer..384-BN
What to Tell the Public About Health. American Public Health Association....384-BN
Fractures and Dislocations for Practitioners. Edwin O. Geckeler..ad page 25
The Management of Fractures, Dislocations and Sprains. John Albert Key and H. Earle Conwell....ad page 25
A Primer for Diabetic Patients. Russell M. Wilder....ad page 25
Practical Neuroanatomy. J. H. Globus....ad page 27
Books received....ad page 25
Borough, S:
Physical therapy section meetings....380
Brain vesicles, the three primary, and the three cranial vertebrae, Part I [Weaver]....345*
Brandon, M. A.:
Hernia section meetings at Cincinnati....379
Brigham, Fleda Margaret:
An essay toward an osteopathic approach to corrective speech problems, Part III....339*
Buck, R. O.:
Proctology section meetings....381
By-laws and constitution, proposed amendments, A.O.A....372
Cabot, Richard C.:
Defense (immunity of the body)....334-Ab
Colleges:
to maintain enrollment, [McCaughan]..367-E
curricular survey....373-Pr.A
Conley, George J.:
The urological specialty....353-COS
Connor, Harriet L.:
Obstetrics and gynecology section....380
Constitution and by-laws, proposed amendments, A.O.A....372
Convention, Cincinnati:
sectional meetings featured....378
hotel headquarters, joint....381
public health and educational meeting....382
Conventions and meetings....384
Cranial vertebrae and the three primary brain vesicles [Weaver]....345*
Crites, A.B.:
Eye, ear, nose and throat section....378
Curricular survey in colleges....373-Pr.A
Cystitis: See Urology
Diverticulum of the bladder and calculi, [Witt]....335*
Ear, systemic treatment, [Deason]....383-COL
Education: See Colleges and Vocational Guidance.
Enucleation of prostate versus resection, [Lamb]....361-COS
Essay contests....344
Fischer, Ralph L.:
Clinical classification of pneumonia....333*
Fistula, persistent suprapubic urinary, [Witt]....335*
Fractures of the neck of the femur, part II, Lamb Hospital Staff....364-COS
Fuller, J. L.:
Nervous and mental diseases section....380
Gordon, F. A.:
Membership effort and honor roll....377
Hazzard, Charles:
The basis for immunity, natural or acquired....327*
Heist, Mary L.:
Educate vocational counselors....377
Holloway, J. L.: Quoted in public health—and organization....369-E
Hulburt, Ray G.:
Public health—and organization....369-E
Deliberate misrepresentation....370-E
Paying in advance—and gladly....370-E
Immunity, basis for natural or acquired, [Hazzard]....327*
defense, [Cabot]....334-Ab
Industrial and institutional service, bureau of: case reports on injuries due....373-Pu.A
Irregulars, dealing with the, [Morgan]..338-Ab
Jones, Edward B.:
Essential diagnostic procedures before urological surgery....354-COS
Jones, Frank F.:
Meeting of public health and education officials....382
Lamb, Howard E.:
Transurethral prostatic resection versus enucleation....361-COS
Lamb Hospital Staff:
Fractures of the neck of the femur, part II....364-COS
Legal and legislative:
re-registration of osteopathic licenses..373-LL
social security and D.O.'s [Bailey]..373-LL
hospital privileges....373-LL
workmen's compensation....373-LL
contraceptives and venereal disease..373-LL
occupational tax....374-LL
narcotic laws....374-LL
measures affecting physicians in Colo., Iowa (chiropractic restriction), Ky., Mass., Miss., N. J....374-LL
N. Y., Ore., R. I., S. C....375-LL
Va., U. S. Congress....376-LL
Canada, Ontario....377-LL
Martin, Orel F.:
Some of the possible end results of urinary retention....358-COS
McCaughan, R.C.:
To maintain college enrollment....367-E
Medical Care, Technical Sub-Committee on, report of....369-E
Medical "West Point"....369-E
Membership, A.O.A.:
paying in advance—and gladly, [Hulburt]....370-E
advance membership honor roll....371
status and honor roll, [Gordon]....377
Misrepresentation, deliberate (re: uniform narcotic drug act in Michigan and A.M.A.), [Hulburt]....370-E
Morgan, E. M.: Dealing with the irregulars....338-Ab
National Committee on Better Care for Mothers and Babies....369-E
Northup, T. L.:
Section on osteopathic manipulative therapeutics....378
Obstetrics: the elderly primipara, [Stinnett]....383-COL
Packard, Fridel M.:
Trichinella spiralis found in thick drop preparation of blood....382-L
Pneumonia, clinical classification, [Fischer]....333*
Prostate:
some possible end results of urinary retention, [Martin]....358-COS
transurethral prostatic resection versus enucleation, [Lamb]....361-COS
Public and professional welfare:
meeting at Cincinnati [Jones]....382
deliberate misrepresentation [Hulburt]....370-E
paying in advance—and gladly [Hulburt]....370-E
Public health—and organization, [Hulburt]....369-E
Radio Programs....368
Reed, A. G.:
Internists section meetings....380
Resection of prostate versus enucleation, [Lamb]....361-COS
Respiratory diseases, therapeutics in, [Copeland]....383-COL
Socialized medicine (public health—and organization), [Hulburt]....369-E
Soden, C. Haddon:
Technic section meetings at Cincinnati....381
Speech problems, an essay toward an osteopathic approach to corrective, Part III, [Brigham]....339*
State Boards:
Calif., Ill., Iowa, Kans., N. C., Vt., W. Va....384-SB
Systemic treatment for diseases of the special sense organs, [Deason]....383-COL
Technic, subjective factors in skilful [Allen]....331*
Transurethral prostatic resection versus enucleation [Lamb]....361-COS
Trichinella spiralis found in thick drop preparation of blood, [Bailey and Packard]....382-L
Urology:
the urological specialty, [Conley]....353-COS
essential diagnostic procedures before surgery, [Jones]....354-COS
possible end results of urinary retention, [Martin]....358-COS
transurethral prostatic resection versus enucleation, [Lamb]....361-COS
persistent suprapublic urinary fistula complicated by bladder calculi and diverticulum, [Witt]....335*
Vertebrae, the three cranial, and the three primary brain vesicles, [Weaver]....345*
Vitamins in otolaryngological conditions, [Koepcke]....ad page 27
Vocational guidance, committee on: educate vocational counselors, [Heist]....377
Weaver, Charlotte:
The three primary brain vesicles and the three cranial vertebrae, Part I..345*
Witt, Philip A.:
Persistent suprapubic urinary fistula complicated by multiple bladder calculi and an associated diverticulum....335*

Published monthly by the American Osteopathic Association. Office of Publication, 1140 Lake St., Oak Park, Ill. Address all communications to the Main Office at 840 North Michigan Ave., Chicago, Ill. Eastern Advertising office, Lawrence B. Williams, Manager, 11 West 42nd St., New York, N. Y., telephone Pennsylvania 6-1949. Subscription, $5 a year. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917 authorized August 31, 1922. Entered at the Oak Park, Illinois, post office as second class matter, April 1, 1926, under the Act of March 3, 1879.

PRACTICAL EVERYDAY BOOKS

INJECTION TREATMENT OF VARICOSE VEINS AND HEMORRHOIDS

By H. O. McPheeters, M.D., F.A.C.S., Formerly Director of the Varicose Veins and Ulcer Clinic, Minneapolis General Hospital and James Kerr Anderson, M.D., F.A.C.S., Instructor in Surgery, University of Minnesota School of Medicine. 82 Half-tones and Line Engravings. Cloth $4.50. Published February, 1938.

In these two monographs complete in one handy volume the injection treatment of varicose veins and hemorrhoids is so presented as to be immediately applicable to actual clinical work.

By word and picture the authors give you in simple detail the important points in the anatomy, the positive diagnosis, the indications and contra-indications for injection treatment, the successive steps of treatment, the preference of solutions giving best results over a period of years and after the experience of making many thousands of injections,—everything,—even the size of the needle.

The value of this up-to-date treatise on these common conditions and in one handy volume by such authorities as Dr. McPheeters and Dr. Anderson is readily recognized.

CLINICAL ENDOCRINOLOGY

By Samuel A. Loewenberg, M.D., F.A.C.P., Clinical Professor of Medicine, Jefferson Medical College, Phila. 852 Pages, 194 Illustrations, 37 Tables and Charts. Cloth $8.00.

This new book tells the whole story of the diseases due to malfunction of the various endocrine glands, their diagnosis, prognosis and treatment and includes the history, the anatomy and the physiology of these glands as well as the many experimental problems and their conclusions.

Each chapter is a complete treatise on an individual endocrine gland. The various diseases are discussed in detail and each disease is treated as a clinical entity. Treatment is exceptionally comprehensive and is presented entirely from the practical point of view.

MATERIA MEDICA, DRUG ADMINISTRATION AND PRESCRIPTION WRITING

By Oscar W. Bethea, M.D., Ph.G., Ph.M., F.C.S., F.A.C.P. Professor of Clinical Medicine, Tulane School of Medicine. 590 Pages. Cloth $5.00. Published February, 1938

This book supplies that actual necessity in every physician's office—a modern authoritative reference on Drug Administration.

All drugs are considered in alphabetic order. The origin, the different preparation, the dosage, the clinical application, therapeutic and toxic action, administration, symptoms and treatment of poisoning, etc., of each drug is concisely stated. Prescription writing is thoroughly covered by text and illustration from the standpoint of both the physician and the pharmacist.

The physician in referring to Dr. Bethea's book sees at a glance, under the different drug headings, just what combinations of a drug and its correct administration have been recommended by leading internists.

TABER'S MEDICAL DICTIONARY

Including a Digest of Medical Subjects

By Clarence Wilbur Taber, Editor and Sixteen Associates. 587 Pages, Thumb Indexed. Beautifully Bound. Fabrikoid $3.00.

A source book of fundamental medical knowledge emphasizing subjects rather than mere words and including practically all terms the busy doctor needs in his daily practice. 25,000 copies in six months. 25,000 selected words 80% of which are defined encyclopedically.

Covering the allied medical arts, medicine, surgery, physical therapy, dietetics, nursing, anatomy, physiology, etc., it would be necessary to purchase scores of books to find the information contained in this up-to-date and money-saving volume.

F. A. DAVIS COMPANY **1912 Cherry St., Philadelphia**

Please Send and Charge My Account—

☐ Injection Treatment of Varicose Veins and Hemorrhoids **$4.50**

☐ Clinical Endocrinology..... **$8.00**

☐ Materia Medica and Drug Administration..... **$5.00**

☐ Taber's Medical Dictionary..... **$3.00**

NAME _____

BASIC OPERATIONS IN COMMERCIAL CANNING PROCEDURES

II. THE BLANCH

● Previously, we have described the reasons for the thorough cleansing of raw food materials prior to canning and the methods by which such cleaning is effected. Another basic operation in the commercial canning procedures for many vegetables and some fruits, is known as the "blanch". (1)

In essence, the blanch is an operation in which raw food material is immersed in warm or hot water, or exposed to live steam. The blanch serves a multiple purpose.

First, blanching serves to soften fibrous plant tissue. By so doing, it contracts or expands these tissues and thus insures a proper final fill in the tin container. Second, during the blanch, respiratory gases contained in the plant cells are liberated. This release of gas prevents strain on the can during heat-processing and favors development of a higher vacuum in the finished product.

Third, the blanching operation inhibits enzymes naturally present in the raw foods and prevents further enzymatic action. Inhibition of enzymes—particularly those inducing oxidative reactions, yields products of superior quality and nutritive values. Fourth, the blanch may serve as an added cleansing measure and also remove "raw" flavors from certain foods. A final function of the blanching operation is to fix or set the natural color of specific products.

In commercial canning practice, blanching is usually accomplished in equipment especially designed for certain types of products. In general, the raw products after thorough washing are conveyed through water or steam by various mechanical devices capable of adjustment so as to subject the raw materials to a particular temperature for the proper period of time.

Such, in broad detail, are the purposes and mechanics of the blanch, a basic operation in many commercial canning procedures.

AMERICAN CAN COMPANY

230 Park Avenue, New York, N. Y.

(1) 1937 Appertising or The Art of Canning, A. W. Bitting, The Trade Pressroom, San Francisco.

This is the thirty-fourth in a series of monthly articles, which will summarize, for your convenience, the conclusions about canned foods which authorities in nutritional research have reached. We want to make this series valuable to you, and so we ask your help. Will you tell us on a post card addressed to the American Can Company, New York, N. Y., what phases of canned foods knowledge are of greatest interest to you? Your suggestions will determine the subject matter of future articles.

THE CHINESE BACK SCRATCHER

NUPERCAINAL "Ciba"

The Chinese back scratcher has been used in the Orient for centuries. In a dignified, leisurely way, the Chinese applies it to his back and other out-of-reach spots that itch.

Nupercainal, "Ciba," is today's anti-pruritic, an analgesic, local anesthetic ointment of prolonged action. Nupercainal relieves pain and itching soon after it is applied. Alleviation often lasts for twenty-four hours. Softly emollient, Nupercainal helps healing processes.

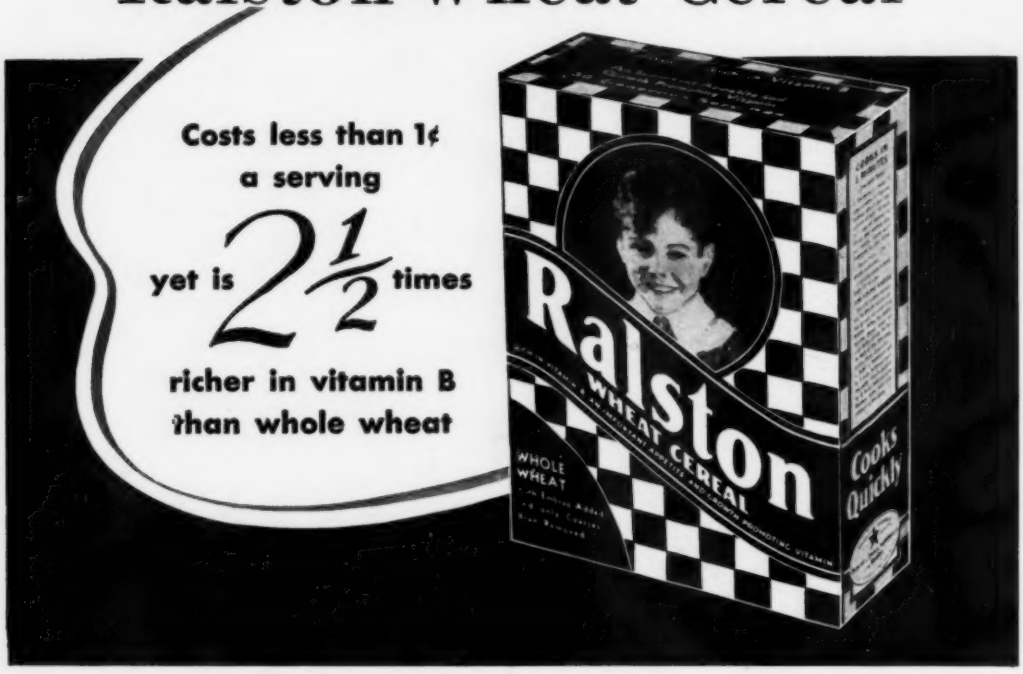
Nupercainal has been successful when all else failed in the treatment of sun burn, superficial burns, dry eczema, pruritus ani et vulvae, cracked nipples, decubitus, etc. Simply write "Nupercainal" on a prescription blank for samples and literature.

AVAILABLE IN ONE OUNCE TUBES (WITH PILE PIPE)
AND IN ONE POUND JARS.

CIBA PHARMACEUTICAL PRODUCTS, INC.
SUMMIT, NEW JERSEY

WE KNOW YOU'LL WONDER AT THIS STATEMENT, DOCTOR

Ralston Wheat Cereal



When you think of expensive, complicated vitamin concentrates it's difficult, we know, to believe this simple statement. Yet Ralston Wheat Cereal *does* cost less than 1¢ for a generous bowlful—and that same bowlful provides 2½ times as much vitamin B as a similar serving of natural whole wheat.

That's because Ralston Wheat Cereal is fine, full-flavored wheat—enriched with sufficient quantities of pure wheat germ to make it 2½ times richer in this precious vitamin B which does so much to keep appetite and digestion normal. (Each gram of Ralston contains 1½ International units of vitamin B.)

In addition, Ralston is completely cooked and readily digested after 5 minutes over an open flame. Research Laboratory Report and samples of Ralston Wheat Cereal will be sent to you on request. Use the coupon.

RALSTON WHEAT CEREAL

RALSTON PURINA COMPANY, Department JO, 2150 Checkerboard Square, St. Louis, Missouri

Without obligation, please send me samples and copies of the Research Laboratory Report.

*Name*_____ *D. O. Address*_____

*City*_____ *State*_____

(This offer limited to residents of the United States)

THE CAMP REGISTERED NURSE KNOWS

Your time is valuable

BUT SO IS THE MESSAGE SHE BRINGS TO YOU

WHEN a Camp Registered Nurse calls on you—she has nothing to sell. Her visit is a link between you and the field of surgical corsetry.

She respects every minute of your time as she explains how the latest and most authoritative developments of medical research have been embodied in Camp Anatomical Supports. She invites your valued opinion of these innovations and their worth in your work.

Personal cooperation of this kind, covering more than twenty-five years, has been of inestimable value to the Camp organization in developing the scientific Camp Supports now available for pre-natal, post-natal, post-operative, hernial, visceroptotic, mammary gland and orthopedic conditions.

A large staff of specially-trained, registered nurses is maintained throughout the country for this important work. At regular intervals these Camp representatives contact thousands of physicians who are actively concerned with scientific anatomical support.

When a Camp Registered Nurse visits you she will value your time as well as your cooperation.

* * *

As a contribution to public health education, The Camp Transparent Woman is now making a transcontinental exhibition tour, teaching women not only the complexity of their anatomy but also the importance of professional medical counsel.

CAMP Supports

S. H. CAMP & COMPANY

World's largest manufacturers of surgical supports

Jackson, Michigan • New York • Chicago • Windsor, Ontario • London, England

The Effect of Alka-Seltzer on Gastric Acidity

This is the second of a series of biochemical and clinical studies to determine the value of Alka-Seltzer as a home remedy for helping to relieve minor, transient symptoms brought on by over-indulgence, etc., such as headaches, "sour stomachs," the early discomfort of a cold.

You will appreciate the rationale of the combined analgesic-alkaline effect which Alka-Seltzer offers in these conditions.

RESEARCH PROBLEM NO. 2

The Effect of Alka-Seltzer on Gastric Acidity

In this determination, a series of clinical experiments were conducted which showed very conclusively that Alka-Seltzer exerts *an antacid effect in the stomach.* Moreover, Alka-Seltzer — presenting acetylsalicylate (Exp. No. 1) in combination with a balanced alkali formula in an effervescent base—was found to behave very differently in this respect from ordinary aspirin taken with water.

Experimental Method

A series of three sets of experiments were conducted on each of six apparently normal male adults.

In each series, determinations of gastric acidity were made by the fractional method of gastric analysis—(1) After Ryle's Test Meal alone, (2) After this meal supplemented with four 5-gr. aspirin tablets, (3) After the feeding of four Alka-Seltzer tablets with this meal.

Data was compiled covering pH of the gastric contents, free hydrochloric acid, total acidity and total chlorine of the specimens of gastric contents aspirated from each subject at intervals of 15 minutes until the stomach was emptied. These findings were plotted in the form of a series of graphs.

Conclusions. Throughout the experimental results a striking difference was manifest between the effects of plain aspirin and of Alka-Seltzer upon the true acidity of gastric contents.

It was found that (1) Alka-Seltzer consumed immediately following the gruel meal effects promptly a hypo-acidity which persists approximately until the stomach has been evacuated completely. (2) Aspirin fed under similar conditions produces a latent hyper-acidity. (3) Alka-Seltzer produces a degree of hypo-acidity by a prompt and persistent neutralization of the gastric acidity.

•

Alka-Seltzer is not intended or advertised to replace the services of the physician. It is a household remedy for the relief of minor, transient ailments.

Alka-Seltzer helps to give relief from "sour stomach," brought on by indiscretions of eating and drinking. Because of its effervescent form it is quickly absorbed to give a rapid analgesic-alkaline effect and is convenient and agreeable to take because it forms such a sparkling, effervescent, palatable solution in water.

MILES LABORATORIES, INC.

Offices and Laboratories: Elkhart, Indiana

No. 3 of a Series

AGAROL HAS HAD A PHYSICAL EXAMINATION—

The x-ray says: "Look for uniform density throughout as evidence of soundness"—and Agarol is a thoroughly uniform emulsion that acts the same way with every dose.

The microscope says: "Look for the small uniform oil globules" as a sign of thorough emulsification of Agarol. It means stability, freedom from oiliness, ready miscibility with water, milk, fruit juices or any other liquid.

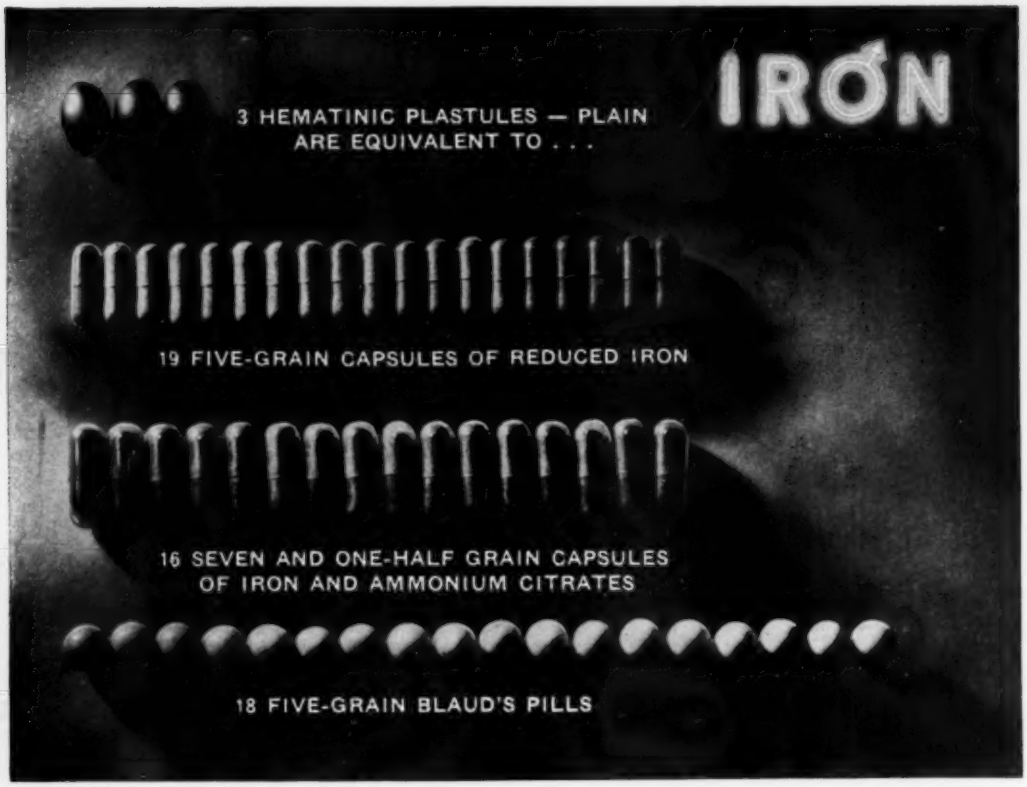
The pharmacist says: "If it pours freely, it is the sign of a good emulsion." And, indeed, Agarol is a good mineral oil emulsion that has thoroughly proved its value in the relief of acute constipation and in the treatment of habitual constipation.

Ask us for the proof. Descriptive folder and a liberal supply of Agarol is at your disposal, but please write for them on your letterhead.

Agarol is available in 6, 10 and 16 ounce bottles.
The average adult dose is one tablespoonful.

WILLIAM R. WARNER & COMPANY, INC.
113 WEST EIGHTEENTH STREET NEW YORK CITY

AGAROL FOR CONSTIPATION


IRON
3 HEMATINIC PLASTULES — PLAIN
ARE EQUIVALENT TO . . .
19 FIVE-GRAIN CAPSULES OF REDUCED IRON
16 SEVEN AND ONE-HALF GRAIN CAPSULES
OF IRON AND AMMONIUM CITRATES
18 FIVE-GRAIN BLAUD'S PILLS

HEMATINIC PLASTULES

IMPROVED IRON MEDICATION

Large doses of iron are no longer necessary for the successful treatment of hypochromic anemia. Independent investigations have proved that Hematinic Plastules yield rapid clinical response, equivalent to the results obtained from massive doses of other forms of iron • The average patient requires only three Hematinic Plastules Plain daily which obviates the unpleasant effects usually associated with massive iron feedings • We will be pleased to send samples and literature on request.

THE BOVININE COMPANY • 8134 McCORMICK BLVD. • CHICAGO, ILLINOIS

IMPORTANT INDICATIONS for CRYSTALLINE VITAMIN B_1

IT has been definitely established that a deficient intake of vitamin B_1 is not uncommon. Hence, Betaxin (crystalline vitamin B_1 hydrochloride) in small doses is a valuable supplement to the diet of infants and growing children, especially in the presence of malnutrition. Therapeutically it is particularly indicated in patients suffering from loss of appetite, reduced activity of the gastro-intestinal tract (secretory and motor), muscular weakness, polyneuritis due to alcoholism, and pernicious vomiting of pregnancy. Betaxin has also rendered excellent service in the treatment of neuritis, neuralgias and nervous disorders. Since the body does not retain an excess of vitamin B_1, toxic effects are not to be expected even from uncommonly large doses over a prolonged period.

HOW SUPPLIED: Tablets of 0.1 mg., 0.5 mg., and 1 mg., bottles of 50; tablets of 5 mg., bottles of 25. Ampules of 1 mg. (1 cc.), boxes of 10 and 100; ampules of 10 mg. (1 cc.), boxes of 5.

Booklet giving detailed information gladly sent on request.

BETAXIN

Reg. U. S. Pat. Off. & Canada

Brand of THIAMIN CHLORIDE

Synthetic Crystalline Vitamin B_1 Hydrochloride

WINTHROP CHEMICAL COMPANY, INC.

Pharmaceuticals of merit for the physician

NEW YORK, N. Y. WINDSOR, ONT.

Factories: Rensselaer, N. Y.—Windsor, Ont.

Atonic Constipation Putrefaction—Dermatosis

DIETARY indiscretions over a prolonged period invariably produce a disturbed equilibrium between the various strains of colon bacteria which comprise the intestinal flora. Such maladjustment results in atonic constipation or putrefaction, frequently accompanied by many gastro-enteric disturbances and a variety of remote reflex symptoms including dermatosis.

TO restore normal physiological functioning of the gastro-intestinal canal and correct the disturbed bacterial relationship, something more than a balanced menu is necessary. This is especially true where the L. Acidophilus has apparently disappeared and excessive putrefaction and toxemias persist.

FUNDAMENTALLY, the condition presents a bacteriological problem requiring immediate suppression of the pernicious putrefactive and proteolytic organisms, supplanted simultaneously by *VIABLE* organisms of an aciduric character.

THIS objective is readily accomplished by Lactobacillal, inasmuch as it is a complete therapy in itself. Lactobacillal organisms are *VIABLE*, requiring no protective enteric coating. They definitely culture in the gastro-intestinal secretions and bowel contents, thereby encouraging rapid development of the aciduric types of organisms native to the individual, particularly L. Acidophilus.

THE specially prepared carbohydrate media in which Lactobacillal organisms are cultured, provide in great abundance, the essential elements so necessary to successfully combat the gastro-enteric disturbances and reflex symptoms associated with intestinal putrefaction and atonic constipation. Adherence to a strict dietary regime, although helpful, is therefore not necessary.

LACTOBACILLAL is presented in powder form, remaining fully viable as long as it is kept dry. It is prepared for professional use only.

Palatable—Convenient—Economical—Effective

Complete information and a regular package will be sent you upon request

Lactobacillal Laboratories, Inc.
2744 W. WILCOX STREET,
CHICAGO, ILLINOIS

MELLIN'S FOOD

A Milk Modifier

COMPOSITION

Reducing Sugars as Maltose	58.9%
Dextrins (by difference)	20.7%
Protein	10.3%
Ash	3.9%
Fat	0.2%
Moisture	5.6%

25 calories in one level tablespoon

Five level tablespoons (125 calories)

Furnishes—

Maltose	20 grams
Dextrins	7 grams
Protein	3.5 grams
Minerals	1.4 grams

Accepted by physicians as an effective means of adjusting milk to the digestive ability of infants who depend upon bottle-feeding for their nourishment and used with remarkable success.

Babies take Mellin's Food mixtures just as readily during the first few weeks of life as in later months and there is no difficulty in instituting bottle feedings as a complete substitute for or in connection with breast feeding.

This also applies in abruptly changing from breast to bottle if conditions are such as to make this move advisable.

Babies fed on Mellin's Food mixtures are comfortable, for digestion usually proceeds without interruption from intestinal disturbances.

The nourishment provided is well assimilated and normal gain in weight may, with confidence, be expected.

Bowel movements are usually regular with stools of a good color and consistency.

Constipation is rare.

Mellin's Food Co., Boston, Mass.

Samples and celluloid formula card sent to physicians upon request.

KNOX . . . CLINICAL NOTES

ONE OF A SERIES OF CORRESPONDENCE EXCHANGES WITH PHYSICIANS ABOUT KNOX GELATINE.

QUERY about the Allergic Manifestion of KNOX GELATINE

A doctor writes, "Would you kindly tell me from what sources the materials used in making Knox Gelatine are obtained? I am especially interested in whether or not it is all beef, all pork, all sheep, or a mixture of proteins from different animals; also is the manufacture constant as to the ingredients used? This is very important to me as I want to use it for special diets in allergic cases, and for this purpose the exact sources of a food must be known and unvaried."

Knox Gelatine Laboratory REPLY

Knox Gelatine is scientifically prepared from carefully selected long, hard, shank *beef bones only*. Twenty-one control and laboratory tests are made throughout the process of its manufacture. As far as we know, no case of allergy has ever been traced to the use of Knox Gelatine. Contrariwise, there is reason to believe that when Knox Gelatine is added to milk, patients sensitive to milk will show no allergic response.

A good example of a CONCENTRATED Knox Gelatine Recipe:

THE KNOX MILK STIR

Place the contents of 4 envelopes of Knox Gelatine in an ordinary drinking glass. Add 4 ounces of cold milk and allow to soak for five minutes. Add 2 more ounces of milk and stir until thoroughly soaked. Then place glass in small cooking kettle of hot water until gelatine milk mixture is thoroughly dissolved. Add 2 more ounces of cold milk, which will bring the temperature to a satisfactory warm drink of about body heat. A tablespoonful of prune juice or a few drops of any bland flavor like vanilla may be added.

Total: 8 oz. liquid—about 250 calories

Sample and useful Dietary Booklets on Request Write Dept. 491

Why you should insist on Knox Sparkling Gelatine

Because Knox Gelatine is 85% protein in an easily digestible form—because it contains absolutely no sugar or other substances to cause gas or fermentation, Knox Gelatine should not be confused with factory-flavored, sugar-laden dessert powders. Knox is 100% pure U.S.P. gelatine. Knox Gelatine has been successfully used in the dietary of convalescents, anorexic, tubercular, diabetic, colitic, and aged patients.

KNOX SPARKLING GELATINE

IS PURE GELATINE—NO SUGAR

KNOX GELATINE LABORATORIES
JOHNSTOWN, NEW YORK

AMONG THE CAUSES OF HYPERACIDITY

Certain disorders almost invariably, but certain "habits" not much less frequently, are the prolific source of gastric hyperacidity. The "last" drink of liquor, that additional cup of coffee, another pipeful of tobacco, rich food that pleases the palate but displeases the stomach, fear and worry—all must share the blame of mischief-making in the stomach.

Pointing out the error of the patient's mode of life and habits may be a preventive of excess acidity in the stomach, but for the prompt relief of the pain and discomfort attending it CAL-BIS-MA supplies the answer. Cal-Bis-Ma accomplishes gastric neutralization promptly and its effect is prolonged. Secondary acid rise and gaseous distention are prevented by its soothing, sedative, protective and adsorbent properties.

Why not ask us to send you literature and a trial quantity of Cal-Bis-Ma? It explains the composition, points out the uses, and lets you test the value of Cal-Bis-Ma by the best judge—yourself.

CAL • BIS • MA

Both powder and tablets obtainable: powder, tins of 1¾, 4 and 16 ounces; tablets, box of 30, bottle of 110.

William R. Warner & Co., Inc., 113 West 18th Street, New York City

After THE MIDNIGHT CONFERENCE

He comes to you. Sharp headache pains. Nerves "shot." Mental faculties dull. Very tired. And digestive system way below par. Yet he must return to his office at once to clear up some important business. He leaves it squarely up to you.

Your first consideration is relief of the pain. You eliminate narcotics. Consider Bromo-Seltzer, which blocks the synaptic junctions and so prevents the transmission of pain sensations to the higher centers. There is no interference with mental activity.

Bromo-Seltzer gives you prompt analgesia — plus gentle stimulation of the intellect. It soothes the irritated nerves and permits relaxation . . . Citrates in Bromo-Seltzer tend to set the digestive system right, to replenish the alkaline stores for improved well-being.

Bromo-Seltzer makes a bubbling, effervescent drink of exceptional palatability. It is economical, efficient, more than an effective pain relief.

Requests for samples and literature receive prompt consideration

EMERSON DRUG COMPANY • BALTIMORE, MARYLAND

THE ADVANTAGES OF USING PENETRO

Penetro contains 113% to 227% more medication than any other nationally sold salve for colds. This greater medication tends to increase circulation and promote faster exchange of tissue fluids.

Penetro is made with a base of highly-refined mutton suet. Being an animal fat, this tends to prevent radiation of body heat and prolongs the benefits of the greater medication.

R. E. Travers, D. O.
c/o St. Joseph Laboratories
Memphis, Tennessee

Please have my druggist deliver to me without charge samples of Penetro, the salve with a base of old-fashioned mutton suet, for clinical tests.

Druggist.....

Street Address.....

City..... *State*.....

Doctor.....

Street Address.....

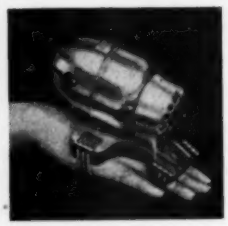
City..... *State*.....

THE SALVE WITH A BASE OF OLD FASHIONED MUTTON SUET

PENETRO

SPECIAL INTRODUCTORY OFFER!

Doctors, we do not expect this Hand Massage Machine to replace Osteopathy, but, we do expect it to be quite an aid to Osteopathy because it allows the combining of mechanical vibration with all the benefits of finger and hand manipulation. It has a marvelous soothing effect upon jumpy nerves, tired muscles, and is a wonder as an aid in the draining of sinuses. Its action is deeply penetrating, soothing and invigorating. Operates on A.C. or D.C. current. Until May 15th, you may purchase this wonderful little machine at $10.00 Cash or C.O.D. or $6.00 Cash and two monthly payments of $3.00 each. After May 15th, the regular price of $15.00 will prevail. We will promptly refund your money upon return of machine if you are dissatisfied after using same for five days. NATIONAL SURGICAL SPECIALTY COMPANY, 19 East Lexington Street, Baltimore, Maryland.



VM-2-BG

The natural Vitamin B complex, indicated in the treatment of

GASTRO-INTESTINAL DISORDERS

Processed from food sources containing eleven basic organic minerals.

Send for your copy of "VITAMINERAL THERAPY"

VITAMINERALS, INC.

3636 Beverly Blvd., Los Angeles, Calif.

When paroxysmal cough is established and internal medication is interdicted, inhalants offer a means of giving relief.

For half a century this inhalant has proven effective. It is penetrating, antispasmodic sedative, and antiseptic.

Vapo-Cresolene

℞ The paroxysmal stage of whooping cough. Dyspnoea in spasmodic croup, and bronchial asthma. Cough in broncho-pneumonia and bronchitis.

ELECTRIC AND LAMP TYPE VAPORIZERS

Write for special discount to physicians and informative Treatise, "Effective Inhalation Therapy."

THE VAPO-CRESOLENE CO.

62 CORTLANDT STREET NEW YORK, N. Y.

Name.....

Street.....

Address..... G

222

Useful... IN MANY INVALID AND CONVALESCENT DIETS

RIPE BANANAS are a natural, soft, bland food ... with a delicate flavor ... popular with most persons ... nourishing ... easily digested ... mildly laxative ... non-irritating ... do not readily ferment in the intestines ... create intestinal conditions unfavorable to the growth of putrefactive bacteria ... yield alkaline mineral residues in the body.

Because of these attributes, together with their soft fibre, pectins, high content of sugars, satiety value, low content of protein and fat, their vitamins (good source of A-B-C-G) and essential minerals, ripe bananas are prescribed by an increasing number of physicians in many invalid diets, including: ulcerative colitis; peptic ulcer; cardiac; diabetes; liver disorders; nephritis; tuberculosis; as well as in various post-operative and convalescent diets.

In the field of corrective diets, physicians are finding that ripe bananas help combat both diarrhea and spastic constipation; also that in combination with milk they constitute a basis for planning a variety of effective, safe reducing diets for persons who are overweight.

LITERATURE ON REQUEST... ADDRESS

UNITED FRUIT COMPANY *Educational Dept., Boston, Massachusetts*

SUPPORT the HEART

CACTINA PILLETS, a mild cardiant, will do much to steady and support heart strength. During senility, pregnancy, acute and chronic infections, prescribe

CACTINA PILLETS

NON-TOXIC NON-CUMULATIVE

OD PEACOCK SULTAN CO.
Pharmaceutical Chemists
4500 Parkview St. Louis, Mo.

NASAL HALITOSIS

Most bad breath is exhaled through the nose.

NASAL Halitosis responds quickly to twice daily applications of V-E-M. Masks offensive nasal odors because its pervading aromatic oils cling to the membrane for hours. Recommend V-E-M for daily Nasal Hygiene to protect the accessible membranes against dust, smoke, fumes and pollen. All druggists can supply it.

SCHOONMAKER LABORATORIES, Inc. O-2
Caldwell, N. J.

Send professional sample of V-E-M (Nasal Ointment with Applicator) for Nasal Halitosis and Nasal Hygiene to

.....D. O.

.....Street

.....City

They Help Us Earn A Place On Your Staff, Doctor

More mothers buy Gerber's! In this leadership special processes and equipment have played their part. And, in seeking appointment to your staff as experts in infant nutrition Gerber has given ten years of faithful effort to achieve in its products the ideals that the medical profession holds for strained foods for infants.

That vegetable and fruit purees may be low in fiber a special equipment has been created for removing fiber. In an hour's time superlative vegetables have passed from fields to kitchens where special cooking processes exclude air and control temperature, to assure the maximum possible retention of vitamins and minerals.

Shorter cooking, for fresher flavor and better color, is made possible by shaking cans 140 times a minute while cooking to distribute evenly the application of heat. By such progress as this in the art of cooking to conserve food values, has Gerber won the esteem of pediatricians, who prescribe with confidence Gerber strained foods for their infant patients.

Gerber's
BABY FOODS

11 VARIETIES FOR A MORE DIVERSIFIED DIET

APRICOT AND APPLE SAUCE . . . BEETS . . . CARROTS . . . CEREAL . . . GREEN BEANS . . . LIVER SOUP WITH VEGETABLES . . . PEAS . . . PRUNES . . . SPINACH . . . TOMATOES . . . VEGETABLE SOUP

More mothers buy Gerber's

A BABY BOOK FOR YOU TO GIVE TO MOTHERS

This famous Baby's Book is available in limited quantities for you to give to mothers who are your patients. Contains no advertising and usually sells for 10c. Written by a registered Nurse, it gives interesting information on general baby care and training, also space for recording weight, progress, etc. For a free copy for your inspection, please mail your professional card or write Dept. 284, Gerber Products Company, Fremont, Michigan.

(In Canada, Gerber's are *grown and packed by* Fine Foods of Canada, Ltd., Tecumseh, Ont.)

IN CONVALESCENCE

It's More Calories

PROPERTIES OF KARO

Uniform composition
Well tolerated
Readily digested
Non-fermentable
Chemically dependable
Bacteriologically safe
*Non-allergic
Economical

*Free from protein likely to produce allergic manifestations.

•

COMPOSITION OF KARO

(Dry Basis)

Dextrin	50%
Maltose	23.2%
Dextrose	16%
Sucrose	6%
Invert sugar	4%
Minerals	0.8%

•

KARO EQUIVALENTS

1 oz. vol.	40 grams 120 cals.
1 oz. wt.	28 grams 90 cals.
1 teaspoon	15 cals.
1 tablespoon	60 cals.

Convalescent children show a low metabolism for several weeks following the disappearance of an infectious fever as a consequence of generalized cellular damages.

The high caloric diet is indispensable. It is made possible by reinforcing foods and fluids with Karo. Every article of diet can be enriched with calories derived from Karo.

Infant feeding practice is primarily the concern of the physician, therefore, Karo for infant feeding is advertised to the Medical Profession exclusively.

FREE *to Physicians only:*

Convenient Calculator of Infant Feeding Formulas; accurate, instructive, helpful. On receipt of Physician's prescription blank, giving name and address, the Calculator will be forwarded. Write Corn Products Sales Co., Dept. AO-4, 17 Battery Place, New York, N. Y.

Introducing

TO THE PROFESSION

A RATIONAL CHOLAGOGUE

Argotane (Improved) is a combination of Papain (vegetable digestive), Bile Salts Compound, Phenolphthalein, Ext. Cascara Sagrada, Ext. Nux Vomica and Capsicum.

In cases where bile therapy is indicated Argotane (Improved Formula) is suggested for your consideration.

Argotane contains in synergestic proportions the two essential bile salts to stimulate liver cells to their functional activity both in the secretion of bile and evacuation of the gall bladder.

Argotane produces gentle, complete bowel evacuation, therefore it is of value as an adjunct in dyschezia.

R. E. Travers, D. O.
The Argotane Company
Memphis, Tennessee

Please have my druggist deliver to me without charge samples of Argotane (Improved Formula), for clinical tests.

Druggist.....

Street Address.....

City..... *State*.....

Doctor.....

Street Address.....

City..... *State*.....

ARGOTANE

"And Control the **PRURITUS** *with* **CALMITOL"**

The universal acceptance of Calmitol is based upon the desirable pharmacodynamic action of this outstanding anti-pruritic. Promptly effective, Calmitol may be depended upon to allay the torment of pruritus for long periods, in all types of cutaneous affections, regardless of etiology.

Its formula (chlor-iodo-camphoric aldehyde, menthol, laevohyoscine oleinate in a vehicle of alcohol, ether, and chloroform) provides adequate local anesthesia to prevent the transmission of impulses responsible for the sensation of itching. Mild antisepsis and induced active hyperemia aid in the eradication of infection and hasten the removal of irritating toxins. In consequence, its action is sustained, intense, and dependable.

Calmitol is indicated whenever itching must be stopped. It is of recognized value in dermatitis medicamentosa and venenata, urticaria, ringworm, eczema, intertrigo, and in pruritus ani and vulvae. Liberal test quantity sent upon request.

THOS. LEEMING & CO., Inc.
101 W. 31st Street . . . New York

NOW YOU CAN STOP ITCHING

Calmitol

LIQUID AND OINTMENT

THE DEPENDABLE ANTI-PRURITIC

PRESENTING

DUOCHOL
(PLESSNER)

for Dependable Choleresis and Cholagogue Action

Duochol (Plessner) provides dependable, specific therapy in a number of biliary tract derangements. Its influence is exerted upon the entire biliary apparatus, augmenting the secretion of bile by the liver, and stimulating gallbladder evacuation. Thus drainage of the entire biliary tree is promoted, food intolerance is corrected, epigastric and right upper quadrant pain is overcome, and postprandial discomfort relieved. Indicated in chronic cholecystitis, toxic hepatitis, catarrhal jaundice, stone-free cholangitis, and reactivated latent gallbladder disease of pregnancy.

Physicians are invited to send for samples and literature

Composition

Each tablet contains highly purified bile salts, 2 gr.; sodium salicylate, 2 gr.; ext. cascara sagrada, ½ gr.; stomachics.

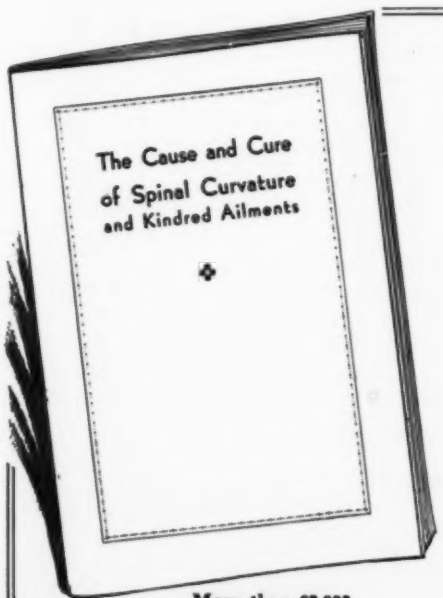
Notably Economical

The reasonable price of Duochol (Plessner) is of importance, since therapy usually has to be protracted.

Availability

Duochol (Plessner) is supplied in bottles of 100, 500 and 1000 Tablets. Available through all pharmacies on prescription.

THE PAUL PLESSNER CO., DETROIT, MICH.



More than 63,000
Cases Successfully Treated

Write today for this interesting free book and a portfolio of "Letters in Evidence" from Physicians.

Philo Burt Company, Jamestown, N. Y.

Let Us Send YOU This Book, Doctor

If you will consider its contents in the light of your professional knowledge and experience, you will readily recognize the scientific merit of the Philo Burt Method as a proper adjunct in your efforts to relieve and correct spinal curvature and kindred ailments.

The Philo Burt Appliance provides efficient anatomical support and protection in cases of spinal injury, deformity and disease. Avail yourself of the first opportunity to conclusively demonstrate its value.

It has been our privilege to co-operate with thousands of practitioners and we gladly refer you to your own contemporaries.

30 DAYS TRIAL

We will make a Philo Burt Appliance to measure, to your order, and allow you 30 days to find it meets the requirements and you and your patients are satisfied.

PHILO BURT COMPANY
181-4 Odd Fellows Temple,
Jamestown, N. Y.

Send me your free book and portfolio of "Letters in Evidence."

Name .....

Address .....

City and State .....

Three New Editions

Exceptional demand for the following out of print booklets has resulted in the publication of new editions.

Modern Miracle Men

By REX BEACH—Famous Novelist

A fascinating discussion of osteopathy which was originally run in The Cosmopolitan Magazine, and reproduced by permission of that publication and the author. Printed on ivory book paper. The illustrations have been omitted, cutting it from 24 to 16 pages. Size 5¾x8¾. Mails unsealed for 1½c per copy.

PRICE: $4.00 per 100. 500 or more, $3.75 per 100. Envelopes: 25 cents per 100.
Imprinting: 50 cents per 100.

Osteopathy, the Science of Healing by Manipulation

By PERCY H. WOODALL, D.O.—Past President of A.O.A.

A revised edition of a booklet which has been a popular seller for twenty years. Printed on good quality white stock, with self cover, and including the original illustrations. 32 pages. Size 5x7½. Mails unsealed for one cent per copy.

Price: $5.50 per 100. 500 or more, $5.25 per 100. Envelopes: 25 cents per 100.
Imprinting: 50 cents per 100.

Osteopathy as a Career

U. S. Office of Education, Department of the Interior, with authority of and by Walter J. Greenleaf, Specialist in Higher Education. One of a series of government vocational guidance leaflets, revised to date, and printed on high grade stock. 12 pages. Size 6x9. Mails unsealed for 1½c per copy.

PRICE: $3.00 per 100. 500 or more, $2.75 per 100. Envelopes: 25 cents per 100.
Imprinting: 50 cents per 100.

Now Ready for Delivery

The price on orders for less than 100 of any of these three titles will be prorated at the rate for 100. No orders for imprinting of the professional card on less than 100.

To Facilitate Ordering Use These Coupons

American Osteopathic Association

540 N. Michigan Ave. Chicago, Ill.

SAMPLE COUPON

Enclosed find ..... cents in stamps for sample ☐ Modern Miracle Men; for sample ☐ Osteopathy, the Science of Healing by Manipulation; for sample ☐ Osteopathy as a Career.
Samples: 4 cents each, all three for 10 cents

Name .....

Address .....

.....

ORDER BLANK

Please send (transportation prepaid in U. S. and Canada, foreign extra) ..... copies Modern Miracle Men; ..... copies Osteopathy, the Science of Healing by Manipulation; ..... copies Osteopathy as a Career; ..... Imprinting as per attached copy; ..... Mailing envelopes desired.

Terms: Cash with order or within 10 days from receipt of bill.

BUFFERED ALKALINIZATION

by the safe, physiological process

WHERE buffered alkalinization is desirable—as during sulfanilamide administration, in the treatment of colds, influenza and other seasonal respiratory affections —Kalak offers these clinical advantages:

(1) It presents a balanced combination of bicarbonates in solution. (2) It contains the mineral substances normal to the blood (and no other).

Kalak's high buffering value helps to maintain the urinary pH of 7.4 which has been found so desirable in sulfanilamide therapy.

KALAK
is synthetically prepared — is hypertonic, uniform in composition, definite in alkali potency.

KALAK WATER COMPANY OF NEW YORK, INC., 6 CHURCH STREET, NEW YORK CITY

Who Uses This
Modernistic Sinustat?

Many leaders in the profession, numerous hospitals, and clinics, the athletic departments of several Universities—all use the No. 1510 McIntosh Modernistic Sinustat. They find its simplicity rivaled by its quietness in operation—its selection of currents adequate for every need of physiologic and physical reaction.

Clinically, it has proved its true therapeutic effectiveness. There's cabinet beauty of definite appeal to enhance any surroundings. Yet, the price involved in the purchase of this unit is moderately low. And, terms are easy!

No. 1510
Modernistic Sinustat

How Can You
Benefit in Using It?

In massaging and toning muscles, to elicit nerve stimulation and muscular response, to determine the reaction of degeneration, to test for malingering, to administer iontophoresis, and to proceed with galvanic surgery techniques—all these and more are ways by which you may benefit with the Modernistic Sinustat. It almost pays for itself in the time it saves. It replaces much of your manual energy —often with better and quicker results. You'll find it fits right in with the basic principles of osteopathic procedures. Let us tell you more about it.

McIntosh makes a complete line of the finest physical therapy equipment—short and ultra-short-wave diathermies, infra-red and ultra-violet generators, colonic therapy apparatus, etc. Full details are available. Your inquiry is cordially invited.

McIntosh Electrical Corporation

235 No. California Ave. Chicago, Illinois

Gentlemen: A.O.A.-4-38

Send literature on the Modernistic Sinustat and explain terms—without obligation.

D.O.

_____

_____

VITAMIN THERAPY

Takes an Important Step Forward

THE WAY in which the medical profession has ever kept abreast of scientific research in the important field of vitamins, has been a striking demonstration of its alertness to new concepts.

Following the discovery of vitamins by Dr. Funk in 1912, doctors everywhere were quick to seize on the first commercial concentrate of A and D, made available by Funk and Dubin in 1923. In following years, as new vitamins were discovered, they have been promptly added to the physician's armamentarium. Their influence on the modern development of nutritional science has been of the highest significance.

Today the history of vitamin therapy takes another important forward step with the recent discovery of the cooperative interdependence existing between vitamins and minerals. In Vi-Syneral, Funk and Dubin have made available a potent concentrate of the six known vitamins—A, B_1, B_2(G), C, D and E—fortified with eight essential minerals—calcium, phosphorus, iron, copper, manganese, iodine, magnesium and zinc.

The superior efficacy of this multiple vitamin-mineral concentrate over mere A-D, A-B-D-G, or even A-B-C-D-G preparations, has been strikingly demonstrated by laboratory tests by Dr. Walter H. Eddy at Columbia University.

Nor have physicians been slow to prescribe the latest scientific Funk-Dubin contribution as a means to corrective diet insurance, and as an aid in the recovery of optimum health and vitality. Clinical reports from all parts of the country attest to the gratifying response to this modern metabolic stimulant.

Vi-Syneral is available in Funk-Dubin balanced potencies for all age groups. The usual dosage is one vitamin and one mineral capsule daily, with any meal.

Write for complete literature and clinical samples.

U. S. VITAMIN CORPORATION
250 EAST 43RD STREET, NEW YORK, N. Y.

VI-SYNERAL

The Original Multiple Vitamin-Mineral Concentrate

Prepared under the direction of
DR. CASIMIR FUNK *and* DR. H. E. DUBIN

The Journal of the American Osteopathic Association

PUBLISHED MONTHLY BY THE AMERICAN OSTEOPATHIC ASSOCIATION

Vol. 37, No. 8 | 540 N. Michigan Ave., Chicago, Ill. | April, 1938

COPYRIGHT, 1938, BY AMERICAN OSTEOPATHIC ASSOCIATION

The Basis for Immunity, Natural or Acquired*

Natural Immunity Osteopathically Developed or Safeguarded

CHARLES HAZZARD Ph.B., D.O.
New York City

The human body is intended by Nature to be immune from infection and disease.

If natural immunity is lacking, it may be acquired.

If it be lost, it may be restored.

If it be present, it may be safeguarded and reinforced.

All of these objects may be provided by osteopathic treatment. McConnell[1] recently said: "At this late date many seem to forget that a basic discovery of Dr. Still was the fact of immunity."

The term *natural immunity* properly implies that the possession of this quality is normal to the human body. However, some allopathic physicians have fallen into the error of implying that natural immunity is very limited, or that a person in a state of health is immune only to some things. The osteopathic thesis is that natural immunity belongs to the natural body.

There are many people who "never get anything." There are others who "get everything." We all know people who at certain periods in their lives "never got anything," but who now "get everything." Many adults who were immune to the ordinary diseases of childhood, having later lost this immunity, acquired, as it were out of turn, diseases of childhood such as measles, diphtheria, whooping cough, and so forth.

But the natural immunity that protected them at one period of their lives may be preserved to safeguard them all of their lives. Often there is pointed out the example of a healthy child fallen victim to infection, which perhaps is epidemic. This is no proof that the child under ordinary circumstances would be susceptible to this disease. Apparently healthy children are extremely apt to be in a status of relative acidosis due to faulty diet, or they may be otherwise toxic, or be suffering from lowered vitality due to rapid growth or to other depletions of vital forces. In this status they readily become victims of infectious diseases.

It has been supposed that many young persons contract throat infections through bathing in pools. This is not just because the germ is present in the pool, but because the system of the person has become chemically unbalanced and therefore susceptible. It is a well-known fact that streptococci and staphylococci are found in most throats. But these do not become harmful until the status of the system becomes abnormally changed and natural immunity is depleted.

The skin is the natural first line of defense. It is a mechanical barrier against infection. Likewise it protects by reason of its function of elimination. By dilating the capillaries of the skin and thus increasing its action, the nervous system contributes to this function. General metabolism, oxygen supply, body temperature, and exercise all contribute to the first line of defense. Chilling of the body surface favors infection. Insufficient oxygen or food supply lowers the vitality of the tissues and likewise favors infection, as witness the well-known fact that one readily "catches cold" or contracts influenza if these essentials are depleted.

From the *Boston Herald* I clipped the following account of a paper given before the 1936 meeting of the American Association for the Advancement of Science:

"Two new groups of chemicals, called precipitins and antigens, were described by Prof. Robert L. Kahn of the University of Michigan, as the 'anchor system' which tends to wall up and concentrate troublesome germs and so to localize infection.

"This anchor system, according to Dr. Kahn, is the body's first line of defense against disease and is found in the skin. Dr. Kahn showed that the skin is ten times better able to combine with these immunizing substances than other parts of the body.

"The skin, he said, goes to work long before there is any sign of defensive activity in the blood."

From the osteopathic viewpoint and in the light of what is later to be said in my article concerning the bactericidal power of the blood, it is reasonable to suppose that healthy blood can, at all times, keep the skin fortified.

It should be stated in all fairness, however, that Professor Kahn appeared to be speaking of precipitins and antigens developed in the laboratory and used in artificial immunization.

The liver, the kidneys, the skin, the lungs, all assist in straining out poisons from the system and

*Delivered before the General Sessions at the Forty-First Annual Convention of the American Osteopathic Association at Chicago, July, 1937.

maintaining the purity of the blood and its correct hydrogen-ion concentration.

The last named must also be included in the first line of defense. It has been called Nature's first defense against disease. It is known that a status of relative acidosis compromises the capillaries in their function. It renders their walls more permeable to poisons and the tissues become toxic as a result.

It is hardly necessary to point out that the use of osteopathic therapeutics is a most valuable means of maintaining normal alkali reserve to combat acidosis. In this connection, too, one should think of the relation of proper diet to health. Incidentally, it is believed that foods grown from soils that are deficient in iron, copper, and iodine, lack vitamins. If this be true, a fruit or a vegetable that looks fine may be deficient; its value to the human system greatly lessened, and the body's powers of resistance handicapped by the lack of proper vitamins and minerals.

In this first line category, also, we must place the mucous membranes of the body which mechanically protect the underlying surfaces. McDowall[2] points out the fact that the upper part of the alimentary canal is protected by digestive secretions, which afford it comparative immunity. He states that it has been shown experimentally (Cornwall) that injection of bacteria into animals produced no marked effects after they had been introduced into the stomach, but brought about severe infections after they had been introduced into the ileum.

When the protection of the skin and mucous membranes fails, the next line of defense is the blood in which the leucocytes are the principal defenders. When an inflammation is set up by the invasion of bacteria, leucocytes flock to the affected area to destroy the microorganisms.

In this connection Starling[3] brings out an interesting point. He says:

> Prior to the work of Metchnikoff, the changes in the blood vessels fettered the attention of physiologists, and the accumulation of leucocytes was regarded as secondary to these changes. Though the alteration of the capillary wall, by permitting the adhesion of the leucocytes, must no doubt favor their migration and their passage from all parts of the body into the inflamed part, we know that the same accumulation of leucocytes occurs in the entire absence of a vascular system. The movement of the corpuscles towards dead or injured tissue must therefore have some other explanation. We have abundant evidence to show that the essential factor in this aggregation of leucocytes is their chemical sensibility, and that the phenomenon is simply one of chemotaxis. A capillary glass tube containing a suspension of dead micrococci, or peptone, or both extracted from dead tissue, if introduced into the anterior chamber of the eye or into the subcutaneous tissue, is found after a short time to be full of leucocytes. It is worthy of note that the positive chemotactic influence exerted by any given species of pathogenic bacterium is roughly inversely proportional to its virulence.

Next in line of defense there are the lymph glands, which perform a somewhat similar service. In addition to these, there is lymphoid tissue, such as is found in the nasopharynx, in the tonsils, and thereabouts. Likewise there are aggregations of lymphoid tissue in the form of Peyer's patches, which, as McDowall[2] states, according to Barclay Smith, may be looked upon as protecting the small intestine from the invasion of bacteria from the large colon. In this connection he mentions the reticuloendothelial system, the Kupffer cells of which, especially in the liver, have the power of ingesting bacteria and excreting them in the bile.

Osteopathic manipulative treatment of the spleen and its important effect upon the blood has been emphasized by our profession. Incidentally, the relation of the spleen osteopathically to both the liver and kidneys should be emphasized, for this trio stands in a very important relation in osteopathic work in the treatment of disease.

THE JOURNAL for January, 1936, reviewed a book entitled "The Spleen and Resistance" by David Perla, M.D.[4] The following quotation is taken from that review:

> The role of the spleen in antibody formation is discussed in one chapter, while others give the effects on natural resistance of splenectomy in animals; the relation of the spleen to acquired resistance in latent infections: compensatory changes following splenectomy and other subjects.

As Macleod[5] points out, "Hemopoiesis occurs actively in the embryonic spleen, but in adult life, becomes restricted mainly if not entirely, to the formation of certain leucocytes." He further shows that anemia is a result of splenectomy.

The spleen performs rhythmical alterations in volume. There are two types of these. A slower form, concomitant with digestion, and also rhythmical contractions occurring about once a minute. The latter are so marked in certain lower animals that the spleen has been regarded as a second heart. Macleod states that "Barcroft and his co-workers . . . have found that the volume of the blood and the total amount of hemoglobin in circulation are related to them." He further points out that in the cat as an experimental animal, "the total hemoglobin content of the blood could be increased by one-third through contraction of the organ, such as occurs in conditions of strenuous exercise." Therefore, from an osteopathic point of view, we would feel that treatment of the spleen would augment the protective power of blood. The liver and the kidneys also help.

McDowall[2] states:

> Once bacteria have gained access to the blood stream, there is good evidence, such as that of Kidd and Chalmers Watson, that they may become eliminated by the kidney. There can be little doubt that if proper culture media are used, the occurrence of a sterile urine is much less common than has been usually supposed. It is considered that should the kidney become overstrained in this respect, the organ itself may become attacked and become the seat of disease, which will vary with the bacteria concerned. The existence of such a mechanism is supported by the fact that the kidney may become the seat of blood-borne disease that does not necessarily exist in any other part of the body.

In THE JOURNAL for May, 1934, there was an interesting editorial by S. H. Herzfeld, M.S., professor of chemistry at the Chicago College of Osteopathy, upon the therapeutic value of the ketogenic diet, i. e., a diet rich in fat and low in protein and carbohydrates. This whole article is recommended to your attention. For our present purpose, however, I quote part of it here as being germane to our thesis:

> The ability of the body to elaborate chemicals for its own protection and repair has been stressed by the osteopathic school of practice since its beginning. The formation of the ketone bodies as bactericidal agents in urinary infections is another illustration of the many similar reactions of which the body is capable. The therapy in these cases consists of utilizing the inherent resources of the body to their fullest extent and in relying on the protective mechanisms of the organism itself.

The liver assists us in the fight for immunity since it is a detoxifying organ. It further assists us by its hemopoietic powers. The bile is Nature's aperient. It possesses slight laxative properties and assists in expelling intestinal contents before bacteria have had a chance to grow to any great extent in them. Therefore, it fortifies against infection.

It must not be overlooked, however, that bile is itself a favorable culture medium. The fact that certain bacteria grow in such a medium leads us to consider the value of keeping liver action free. Emphasis should be placed upon this point since a sluggish gall-bladder, on account of this property of bile, may become a seat of infection as a result of bacteria creeping into it from the colon.

Being called to a case of extreme toxic headache of years' standing, which had eluded the best efforts of physicians of all schools, and having made a careful physical examination of the patient, I finally said that I suspected the presence of chronic disease in the appendix and gall-bladder. The patient protested that he had never had symptoms of either. X-ray, however, revealed that he had both. Bacteriological examination of the stool revealed an extensive pathogenic flora. The infection had crept from the colon into both the appendix and the gall-bladder. Manipulative treatment, diet, and the institution of measures to correct the flora with the use of lacto-dextrin, relieved the patient. No operation was needed. We know that cases of diphtheria, so proved by the taking of cultures, are successfully overcome by osteopathic measures without the use of antitoxin or other drugs. The success of osteopathy in preventing and in bringing about recovery from both pneumonia and infantile paralysis is notable. Osteopathy saves lives in *all types* of pneumonia, regardless of whether there has been developed a serum for a given type, *because osteopathic treatment causes the body of the patient to use its own biochemical resources to make for itself the right one.* So many persons suffering with pneumonia, and given up to die, have been saved by osteopathic manipulative treatment, that one cannot escape the conclusion that this is so.

Independent research is nowadays confirming that which the followers of osteopathy have long contended. For example, *The New York Sun* of November 17, 1936, contained the following:

> Chicago, Nov. 17 (U.P.)—Man's body creates its own cure for pneumonia—a special cell which "eats" the pneumonia germ [has been found], the National Academy of Sciences was informed today at its autumn meeting.
>
> Dr. O. H. Robertson, professor of medicine at the University of Chicago, described the process for the first time.
>
> "When pneumonia occurs," he said, "certain small fixed tissue cells in the lungs create a special type of larger size. These special cells engulf and digest the penumonia germs and do it much faster than ordinary phagocytic, or engulfing cells.
>
> "When the disease is conquered, the special cells disappear and are replaced by the normal type."

If this be true and the body is able to combat pneumonia by such a mechanism, it would be just as able to combat any other infection by setting up a similar mechanism of defense. Such things go far to confirm our major premise.

Cerebrospinal fluid has been found to be somewhat bactericidal and contains antibodies.

It has been found that the secretions of the lachrymal glands contain a substance, lysozyme, which is said to work like vitamin A in assisting the system to ward off infection. Tears, therefore, it would seem, are an aid in protecting the eyes and nasal passages against infection[7].

The lymph, according to Macleod, is purely a scavenger.

The bone marrow in certain infections is stimulated to throw out an increased number of young cells into the blood.

In acute poliomyelitis it has been found that there is a great natural resistance in most individuals. This power of resistance is partly in the nasal secretions of a healthy individual. Harold Amos[8] of Johns Hopkins Hospital, has shown that poliomyelitis virus, plus the normal secretions from a healthy nose, allowed to stand for a time and then injected into the spinal canal of a monkey does not produce the disease. He has also shown that the use of antiseptics in the nasopharynx in an effort to prevent infection is disastrous.

L. H. Walker, D.O.,[9] in THE JOURNAL for October, 1935, refers to the Amos experiment as follows:

> A healthy individual is selected who has never been in contact with the disease and whose nasal washings have been proven by experiment . . . to neutralize the virus. His nasopharynx is treated with some one of the antiseptics, saline solution, argyrol or even plain water a few times. After treatment his nasal washings are mixed with the virus and injected into the spinal canal of a monkey and his nasal washings have lost the power to effect a neutralization of the virus.

Walker[9] calls attention to the statement made by the Washington State Department of Health: "There is no reliable treatment available for the prevention of poliomyelitis," and goes on to speak of the experience of the Los Angeles County Osteopathic Hospital during the recent infantile paralysis epidemic:

> Los Angeles was in the midst of an epidemic of this dread disease which was attacking young and old alike. Unit No. 1 (medical) saw its nursing and physician staff decimated by the contagion of paralysis, while Unit No. 2 (osteopathic) instituted daily osteopathic treatment for all connected with the institution and, so valuable was the prophylaxis of these treatments, no one was lost from duty during the entire epidemic.

A few years ago Sir Almroth E. Wright, a famous English pathologist, in lauding the value to health of exercise, stated that he had found that the blood of football players was more bactericidal after play. It is, of course, well known that both the whole blood and blood serum are germicidal and antitoxic. It is clear that exercise, either as the result of physiological gymnastics; that is, the casual use of tissues in the performance of function, or exercise deliberately employed as a means of health, is the greatest natural means of increasing blood flow.

Starling[8] shows that chemical stimulation of the vessels themselves by means of metabolites, or substances produced by the chemical changes accompanying their activity, is one of the most important causes of increased blood flow. He shows that the flow of blood laden with the results of muscular metabolism, such as lactic acid or carbon dioxide, produces a marked dilatation of the blood vessels in the *used part.* To this he adds the further fact that carbon dioxide, an universal hormone, acts upon the vasomotor centers, medulla and spinal cord, causing contractions of the blood vessels. This is to say that

exercise produces lactic acid in the local tissues, which lactic acid gives off CO_2 from its carbonates, which in turn acts to cause dilatation in the blood vessels of the active part, but vasoconstriction elsewhere.

It is obvious, therefore, that the presence of an increased amount of blood in a part gives it increased immunity to infection. We all know that by osteopathic means we can practically at will increase the blood flow through a given part, as well as in general.

In those who can take no exercise, the use of osteopathic manipulative treatment, circulating the blood actively, is a vitally important protective measure.

The bactericidal power of the blood, however, does not rest solely upon the phagocytic power of the white blood corpuscles. The serum of the blood itself possesses this power. Vaughan and Novy[10] state:

> The bactericidal action of normal blood is probably due to the presence of enzymes. . . . It has also been shown that normal serum may in some instances manifest anti-infectious properties. For instance, one-tenth cc. of the blood serum of men who have never had typhoid fever agglutinates readily the bacillus of the disease. Not only is this the case, but the blood serum of such men may protect animals against the peritonitis normally induced in them by the typhoid bacillus. It follows from these observations, which might easily be multiplied, that the blood of normal animals frequently contains anti-infectious substances.

Incidentally, it has been shown that the serum of blood is much more bactericidal than the plasma of the blood. Hence, we see that a wound, for example, glazed with blood serum which Nature constantly supplies, is thus protected against infection.

In this connection Starling[3] says:

> Normal blood serum is found to have a strong destructive influence on most species of bacteria, whether pathogenic or not. Since this property is not shared to anything like the same extent by the blood plasma, it may be ascribed to the breaking up of bactericidal substances. Extracts made from any collection of leucocytes have a similar bactericidal effect, and it has been shown by Wright that the ingestion of bacteria by normal leucocytes goes on much more rapidly in the presence of blood serum or if bacteria have been previously subjected to the action of blood serum.

It is interesting to note in this connection a statement by McDowall[2]:

> Local heat is . . . very effective in raising body temperature, and there is evidence that the antibactericidal power of the blood is increased when the body temperature is increased.

Heat, through increasing the circulation of the blood, calls to the site of infection more red corpuscles and more white corpuscles. Phagocytosis is encouraged. These facts have been taken into due account by Deason,[11] and others in the treatment of disease by raising body temperature.

The chemical basis of immunity is furnished chiefly by blood. It contains immune bodies and lysins which are substances produced in it which are able to kill bacteria by a process of lysis. McDowall[2] quotes Muir as saying:

> that the substances are not in themselves capable of destroying bacteria, but act as sensitizers in that they make it possible for the substances known as complements, or alexins *normally produced in this serum,* to attack bacteria. (Italics mine.)

The blood also contains opsonins, which are similar to immune bodies, which, nevertheless, can act in the absence of complements.

According to McDowall the toxins produced by bacteria are neutralized by antitoxins formed in the blood serum. This is the basis for the practice of artificial immunity. It likewise becomes in part the basis for the osteopathic contention that the body produces its own agents for its protection in disease. Osteopathic manipulative treatment causes the body to erect its own fortifications against the onslaught of the disease.

Various precipitins and agglutinins which are supposed to be anti-substances are found in serum after the injection of antigen.

In this connection Vaughan and Novy[10] say:

> There are bacterial enzymes which in the animal body destroy not only the bacteria cells but their toxins as well. . . . The bactericidal action of normal blood is probably due to the presence of enzymes.

In recent years it has been shown repeatedly by scientists that immunizing substances are extracted from pathogenic bacteria, such as streptococci, and so forth.

The New York Times of January 3, 1937, in reporting the proceedings of the American Association for the Advancement of Science speaks of this matter as follows:

> Antigens are that part of the bacteria, which, when used in the form of vaccines, increases the body's resistance to that particular bacterial disease by stimulating the body's defensive mechanisms to producing a plentiful supply of antibodies. Thus the antibodies are the direct immunizing agents, whereas the antigens are the agents which stimulate the building of the antibodies.

This is, of course, the basis for the use of vaccines and sera. But we would believe that, as shown by the remarkable record of osteopathic physicians in overcoming pneumonia and other virulent diseases, we assist the body in the work of elaborating according to the invading organism its own natural serum.

Starling[3] says:

> Finally there may be produced as a result of the excess of microorganisms, substances such as the amboceptors, which render the microorganisms susceptible to destruction by the complements or cytases normally present in the circulating fluids and possibly themselves derived from the activity or destruction of the leucocytes and other phagocytes of the body.

Perrin T. Wilson, D.O.,[12] says:

> Natural immunity is the most important factor in the entire human problem, and yet very little is said about it. It is osteopathy's cornerstone. If we have it, we live. If not, we die. . . . To those who grasp the whole picture, disease is a failure on the part of the body and not the success of an invading germ.

In the *British Osteopathic Review* for February, 1935, Wallace M. Pearson, D.O., under the caption "Research Substantiating the Osteopathic Claim," says:

> It is interesting to know that the principle of natural immunity (self-contained body protection in response to external stimulation) was propounded as a fact twenty years before Ehrlich read his classical paper on immunity in 1906. Now we know how the body creates its own medicines, while in the early days of osteopathy such a thought was revolutionary. In order to maintain this protection there must be adequate blood supply to the cells so that they have the vital elements from which they can build a response.

Fundamentally it is the blood which offers the human body the most valuable protection against infection. If it be kept pure and in good circulation,

it constitutes a mighty fortress against the invasion of disease. The chemical basis of immunity lies here. The biochemistry of the human body is the sharp and ready tool in the hands of the osteopathic physician.

"The blood is the life." "The rule of the artery is supreme."

From this general summary of the various bactericidal and other protective powers residing in the human body, it may be concluded readily that the body is so constituted as to resist the invasion of pathogenic agents.

We have endeavored to make a thorough review of what the human body possesses as a basis for immunity, natural or acquired. Reviewing these facts, considering all the evidence, we must conclude that the human body does possess the basis for natural immunity. Well and truly did Still say: "The body has its own drug store inside it. It is your business to see that this drug store is well run."

Osteopathy's power to rally all the natural defenses of the body against disease, for either protection or cure, is the very core of its greatness. To construct or insure *natural immunity*, or, this lacking, to construct or insure *acquired immunity* constitutes osteopathy's great contribution to human well-being.

551 Fifth Avenue

REFERENCES

1. McConnell, Carl P.: Certain Factors in the Treatment of Children. Jour. Am. Osteo. Assn., 1934 (June) 33:431-434.
2. McDowall, R. J. S.: Clinical Physiology. D. Appleton and Co., New York, 1927, p. 309.
3. Starling, E. H.: Principles of Human Physiology. Ed. 4. Lea and Febiger Co., Philadelphia, 1926.
4. Perla, David: The Spleen and Resistance. Williams and Wilkins Co., Baltimore, 1935. Reviewed in Jour. Am. Osteo. Assn., 1936 (Jan.) 35:267.
5. Macleod, J. J. R.: Physiology and Biochemistry in Modern Medicine. Ed. 6. The C. V. Mosby Co., St. Louis, 1930, pp. 92-94.
6. Herzfeld, S. H.: The Therapeutic Value of a Ketogenic Diet. Jour. Am. Osteo Assn., 1934 (May) 33:398.
7. Reported in the proceedings of the Society of American Bacteriologists, *New York Times*, December 31, 1936.
8. Amos, Harold: Johns Hopkins Medical School Bulletin of The New York Academy of Medicine. Vol. II, No. 9, Sept., 1926. Reviewed in Jour. Am. Osteo. Assn., 1935 (Oct.) 35:107-108.
9. Walker, L. H.: Acute Anterior Poliomyelitis. Jour. Osteo., 1935 (Sept.) 42:3-4. Reviewed in Jour. Am. Osteo. Assn., 1935 (Oct.) 35:107-108.
10. Vaughan, Victor C., and Novy, Frederick G.: Cellular Toxins or The Chemical Factors in the Causation of Disease. Ed. 4. Lea Brothers and Co., Philadelphia, 1902, pp. 177, 179-180.
11. Deason, Wilborn J.: Arthritis Treated by Thermogenic Therapy. Jour. Am. Osteo. Assn., 1934 (May) 33:389-391.
12. Wilson, Perrin T.: Personal communication.

Subjective Factors in Skilful Technic*

PAUL van B. ALLEN, D.O.
Indianapolis

The importance of skilful technic, both as a means for obtaining satisfactory therapeutic results and as a tangible reflection of the truth of osteopathic theory, is an admitted fact, yet it is interesting to observe the great variation in the skill with which it is applied. Some technicians seem to have a knack which was apparent almost from their school days, while others even after years of practice still lack the finesse that marks real dexterity.

In considering these things, it occurred to me to compare osteopathic technic with that in other fields requiring bodily skill, and immediately a great and fundamental difference is clearly evident. The pianist gives comparatively but little thought to the mechanics of his piano; the golfer studies somewhat more the balance of his clubs; the fly fisherman, the backbone and whip of his rod and the weight of his line. But in each case, infinitely more thought and time are given to a study of the proper, balanced use of fingers, wrists, arms, and, in fact, of the entire body, and to long practice to make that use thoroughly skilful. Contrast the study of osteopathic technic, and it is as if one spent much time studying the structure and action of a golf club or of a fly rod; and very little, the use of one's body in the technic of handling the club or rod skilfully. We spend much time analyzing the structure and action of the spine† and of the lesion therein, and properly so, for a spine is a far more complicated structure than a fly rod. But in our study of technic there is nothing to correspond with the hours of practice expended by golfer or fly caster in perfecting balance of body, skilful turn of wrist and arm.

Therefore, it has seemed to me that we might well give some thought to these subjective factors in skilful technic, in an effort to substitute for imitation and for the usual trial and error methods, certain rational principles of using one's self skilfully.

Basically, in osteopathy, as in any of these other fields, technic consists simply of the application of a force to a mass. The force is produced and applied by the operator's body, and the mass is the lesioned spine of the patient. The force has four characteristics: Direction, distance, quantity and speed.

The first two of these, direction and distance, are determined by the mechanical relationships of the vertebra in lesion; while the latter two, quantity and speed, depend upon tissue resistance and joint mobility. The first requisite of skilful technic is, of course, the ability to sense accurately the exact malposition, and the fine nuances of tissue resistance and of joint mobility in the lesion; and to visualize precisely, in terms of these conditions, the exact force required to correct it.

The second requisite is the ability to create in one's self, in one's hands and arms and body as a whole, the exact amount of force necessary; and to apply it precisely, as to direction, distance and speed. It is this second requisite which we propose to consider chiefly. Among many factors which one will observe as he thinks of technic from this point of view, we will choose four only, two mechanical factors—

(1) the relation of fulcra and their associated leverages and,

*Delivered before the Technic Section at the Forty-First Annual Convention of the American Osteopathic Association at Chicago, July, 1937.

†Throughout this paper, the spine is considered, not because the osteopathic lesion is confined to the spine, or even to the joints, but because it is typical, and most frequently thought of in our work.

(2) leverages with relation to muscle action; and two mental or psychological factors—

(1) the follow-through, and

(2) dynamic relaxation, related to rhythm, balance and muscle sense.

In discussing the first factor, fulcra and their related leverages, we recall that the levers of the body are almost without exception of the third class, with the fulcrum at one end, the weight at the other, the force being applied between. In analyzing a given technic, one should first study the leverages and fulcra available for use. We note that there is a basic fixed fulcrum or anchorage and subsidiary moving fulcra. Sometimes the feet are the anchorage and all fulcra above, from hips to fingers, are subsidiary, while at other times the anchorage is at some of the higher joints. Again with a low anchorage, some of the subsidiary fulcra may be held fixed, as when with anchorage at the sacrolumbar, the shoulder and elbow are fixed, and the whole weight of the trunk is swung directly into the hands. All of us can illustrate these points in various familiar methods of technic. Usually, the greater the force required and the longer the distance, the lower is the fixed anchorage and the longer the leverage; while the less the required force and the shorter the distance, the higher is the fixed anchorage and the shorter the leverage. The former permits less fine control of the force; the latter, more. Again, a lower fulcrum may be fixed in order to obtain a certain position of the patient, while higher fulcra are utilized to direct the force. As one's skill increases, higher fixed fulcra, shorter leverages, less, but more finely attuned force are apt to be used. We would doubt the skill of a technician who fixes his fulcra from feet to wrists and swings at a cervical correction with his entire body.

The second mechanical factor concerns the action of muscles upon levers. It has long been observed that muscles operate more easily, smoothly, and surely and with less energy expenditure if they are working in the middle half of their possible range of motion. A technic should be planned therefore so that no muscles are compelled to work at either extreme of the range through which the associated levers can move. Neither should a procedure compel a muscle group to approach too closely its limit of power. Muscles fail to operate smoothly when required to do work that comes close to the limit of their capacity.

The first mental factor is what we choose to call the "follow-through," and it includes the principle of timing. If we take as an example of the follow-through in applying a force to a mass, that of a tennis racket striking a ball, we would diagram it as an arc, thus:

The racket begins the stroke at A, strikes the ball at X, and ends the stroke at B. It is obvious that the force of the racket increases progressively from A to X, which is the point of contact and of greatest force, and then progressively diminishes from X to B. The effective stroke therefore involves the following:

(1) An even acceleration of force from A to X.

(2) Application of maximum force at X, the point of contact.

(3) An even diminution of force from X to B, the end of the stroke.

It is possible to meet these requirements by maintaining an intention to follow-through; that is, a determination to carry the force up to its maximum at X, and, with a clear *visualization* of the progressive diminution of the force to B, an *equal determination* that it shall diminish gradually and progressively. Without this visualization of, and determination upon, the period of relaxation, there would intervene an intention to stop at X, with the result that the point of maximum intensity of force would occur at some point previous to X, the point of contact. Energy would thus be dissipated and the stroke become less effective. With the intention to follow-through, the muscles do not begin their preparation to relax until contact is made, and the result is accurate timing and effective, supple, resilient use of force. This involves a mental, nervous, and muscular coordination, so that one senses and isolates the point of contact or thrust, yet concentrates, not upon it, but upon the relaxation beyond it. It depends, too, upon the development of the ability to sense surely the action of one's muscles, an awareness of their coordinated activity. Let me quote a worker in another field, who says: "It is the consistent maintenance of the intention to follow-through, throughout the movement from its mental conception and nervous initiation to its physical culmination which constitutes true freedom and suppleness in any act of touch."[1] In applying this principle to osteopathic technic, two things are brought about: First, maximum force is applied at that point in the arc of motion where the correction actually occurs, and is not dissipated against the flexible resistance of impeding muscles and ligaments before it has become effective; second, the predetermined relaxation beyond the point of contact prevents the painful and damaging possibility of carrying the thrust beyond the point of correction, straining and traumatizing tissue. It brings about, too, a general smoothness and precision of technic that enhances its ease and certainty.

Finally, there is the principle of what I have chosen to call "dynamic relaxation," which is not so much a factor apart, but the sum of them all, the end and aim toward which we are working. Gerald Stanley Lee[2] has said that rhythm is moving balance, an oscillation or floating between opposing points, and to a degree this is included in the concept of dynamic relaxation. Note the bodily state of a cat stalking its prey; at times to the eye it is wholly motionless, yet every muscle is attuned and in readiness to be brought into beautifully smooth, fluid and forceful action. The cat is relaxed, but not flaccid, at rest and yet able with minimum effort and no loss of time, to put forth maximum force. It is this perfectly coordinated state toward which we aim and which we call "dynamic relaxation."

Let us summarize the suggestions we have made. We have not minimized the absolute necessity of a

complete knowledge of the lesion and of a careful and a precise preliminary sensing, a "tactualization" (if we may coin a word), of all its elements. But we have sought to emphasize the value of considering the manner in which the operator uses his own self in applying corrective force to the lesion. That force must operate through certain leverages, acting from certain fulcra, and moved by coordinated muscle action. The principle of the follow-through guides that action, and the state of dynamic relaxation permits muscles to be brought into play smoothly and easily. The use of the self according to these and associated principles which you will, I hope, work out for yourselves, should help to attain the dynamic relaxation, the rhythmic balance which promotes ease, fluidity, smoothness and resilience in applying one's force to the lesion in a truly skilful procedure of technic.

CONCLUSION

We have aimed in this brief paper to present certain fundamental principles and not specific technic. As a basis for perfecting our own technic, and for adopting more efficiently that of other technicians when indicated, we believe that the frequent consideration of this more general approach will prove more fruitful than the constant and exclusive study of specific technic.

516-17 Merchants Bank Bldg.

REFERENCES

1. Fielding, Thomas: Science of Pianoforte Technique. Ed. 2. Macmillan Co., New York, 1933.
2. Lee, Gerald Stanley: Recreating One's Self. Coordination Guild, Northampton, Mass., 1934.

The Clinical Classification of Pneumonia

RALPH L. FISCHER, D.O.
Philadelphia

Clinical classifications are the "working outlines" of the physician, for they crystallize masses of data into concrete forms. Therefore, the classification of any disease into its various divisions is an integral part of the armamentarium used in the attack upon it. A suitable classification must be basically simple and understandable. To be of value clinically, the study of a disease must be broken down into individual parts, furnishing practical points in etiology, diagnosis, social aspects, prognosis, and management. Unless a study is so divided, it is of academic value only—not of clinical use.

For many years it has been distinctly to the advantage of the practitioner to classify pneumonia on a basis of morbid changes in the lung. An understanding of the associations of the pathologies of lobar and lobular pneumonia to clinical changes in patients suffering with pneumonia quickly become a part of each doctor's equipment. Such a classification, therefore, has proved its efficacy and still continues to deserve full recognition. For the complete explanation of the physiopathological conditions and clinical criteria in the various pneumonias, one must look to the changes in the lungs. I see no present reason to believe that the more modern etiological classification (that on a bacteriological basis) will ever replace the older one. However, the bacteriological classification offers to the osteopathic school of healing several additional benefits. The practice of examining sputum in all respiratory cases will lead to earlier and better diagnosis. When reports of such examinations are received, the prognosis can be more easily and more accurately estimated and the management of the case can be more readily outlined than without them. Finally, the bacteriological classification will make possible a comparison of duration and mortality in the various specific types of pneumonia under osteopathic care.

It has been found that each type of bacteria which produces pneumonia causes definite clinical phenomena and may result in certain complications. The death rate for each type is gradually being evolved. Grave types with high mortality may even now be recognized before death is imminent. The duration of the disease can be estimated. (It is already fairly well established, for instance, that pneumococcic type VI runs a protracted course averaging about six weeks.) Early sputum examination offers much of value during the incipiency of the disease.

Mortality tables based upon the bacteriology are already available,[1] so, too, is information concerning complications and sequelae. Certainly advance knowledge of these very vital considerations prepares a physician better to care for the pneumonia patient. The frequency, duration, and type of osteopathic manipulation, the nursing care, and the use of adjunctive measures will all be more satisfactorily determined if the severity of the infection is known before the clinical crisis occurs. For those who choose to use therapeutic sera, it is essential that the bacteriology be established very early. Whatever value this method holds depends upon the sera being used during the first day or two of the pneumonitis. After 72 hours, sera are admittedly useless.

Forewarning of complications places the physician on guard for days prior to their onset, makes sudden changes in the patient's condition understandable, and directs the physician's diagnostic efforts into definite channels.

Statistics upon the results of osteopathic treatment of pneumonia are scarce and generally undependable for unbiased appraisal; so, too, is the mathematical evaluation of serum therapy. If we begin now to type each case of pneumonia, we will arrive at numerical conclusions in the same manner and under the same classification as those being collected by the older school. In this way only can we hope to gain appropriate recognition for our method of treatment in each of the many varieties of pneumonia. With the bacteriology established in the same way, the results of all methods of treatment can be put side by side for comparison. Such opportunity must tempt every scientist, regardless of his school of training.

A classification[2] based on causes consists of the division of cases into (1) bacteriological—the pre-

dominant organisms in the sputum, (2) those produced by viruses, and (3) chemical and mechanical (caused by aspiration of fumes, dusts, fats, and escharotics). This division depends chiefly upon accurate laboratory study. There are, therefore, pneumococcic, streptococcic, staphylococcic, Friedländer's bacillus, influenzal and various other types of pneumonia. These are subdivided into special types, as pneumococcus type I, streptococcus hemolyticus, staphylococcus aureus, Friedländer's A, etc., according to bacteriological form and behavior.

Most prevalent of the adult pneumonias are those caused by pneumococci, of which there are thirty-two types, each identified by a Roman numeral. These are differentiated one from the other by a process known as quelling.* The quelling phenomenon was first described by Neufeld in 1902 and represents a swelling of the capsule of the diplococcus pneumoniae when it is mixed with the diagnostic serum of the same type. Hence type I diagnostic serum will cause quelling of pneumococci type I in the sputum specimen, but no quelling in any of the other thirty-one types. This differentiation by the Neufeld method can be made in less than thirty minutes.

Pneumococci types I, II, and IV frequently cause bacteremia. In the first two the invasion of the blood stream occurs in nearly half the cases and the death rate is very high. Type III, on the other hand, though not noted as a bacteremic type, has a mortality of 42.7 per cent,[3] which approximates that of type II. This high mortality in type III, it is believed, may be accounted for by the fact that type III pneumonia is prevalent in the middle-aged and elderly.[4] Type VIII resembles type III very closely. Type V first invades the hilar regions and spreads but slowly to the periphery, hence pleuritic pain is not an early observation and pleurisy is rare. On the other hand, type VII involves the pleurae early and often. Though much less fatal, type IX resembles type I very closely, in that the onset is very sudden and marked consolidation is noted. The above-mentioned types all fall in the pathological classification of lobar pneumonia.

Bronchopneumonic distribution is characteristic of types VI, XIV, and XIX and they are the commonest childhood types.

Friedländer's bacillus pneumonia occurs in the undernourished and debilitated and carries a death rate of 90 per cent. Most deaths occur early in the disease, following bacteremia, abscess and gangrene of the lung. Fortunately, it is an exceedingly rare type of pneumonia. Friedländer's bacillus pneumonia has been classified into four groups,[5] types A, B, C and an unclassified group, but despite this, there is but slight variation in their clinical behavior.

Streptococcic pneumonias are grave because of the possibility of blood stream infection. At present two types are recognized—that caused by the hemolytic organism (usually lobar in distribution) and that caused by the streptococcus viridans (bronchopneumonic). The former is nearly 100 per cent fatal when it invades the blood. The streptococcus is important in many childhood cases and also as a reinfective agent in other pneumonias.

Special mention must be made of empyema which occurs as a complication of streptococcus hemolyticus pneumonia, since it is of a rapidly fulminating type. Unless properly managed, it causes death. The control of this complication depends upon performing daily thoracenteses beginning immediately following the diagnosis. This daily aspiration should be completed, regardless of amount, until the pus becomes too thick to pass through the trocar. Then thoracotomy must be performed without delay and constant and adequate drainage maintained.

Staphylococcus aureus pneumonia in adults is similar to the streptococcic form in that it, too, is frequently complicated by empyema. But in addition, the staphylococcic infection results in multiple pulmonary abscess formation, especially in children. None of the cases of this type reported in children have lived.

If it is possible to predict the course, duration, severity, and possible outcome of cases of pneumonia by establishing the bacterial etiology early, we believe that the bacteriological classification offers much of value to every doctor. Though authentic data are still insufficiently established, there is enough evidence to warrant all the emphasis that is presently being placed upon the value of laboratory examination of the sputum.

Even though an osteopathic physician may not approve the use of therapeutic sera in pneumonia, he can find much practical use for the diagnostic sera to differentiate and segregate the thirty-two types of pneumococcus.

6112 Germantown Ave.

*Quelling: English term for German "quellung."

REFERENCES

1. Bullowa, J. G. M.: The Management of the Pneumonias. Oxford University Press, New York, 1937.
2. Bullowa: *Ibid.*, p. 1.
3. Cecil, Russell L.: A Textbook of Medicine. W. B. Saunders Co., Philadelphia, 1934, p. 36.
4. Blake, Francis G.: Observations on Pneumococcus Type III Pneumonia. Ann. Int. Med., 1931 (Dec.) 5:673-686.
5. Julianelle, L. A.: The Distribution of Friedländer's Bacilli of Different Types. Jour. Exper. Med., 1930 (Oct.) 52:539-545.

Defense

Antitoxin, which we think of as manufactured outside the body, the body itself manufactures. Long before we had diphtheria antitoxin the body manufactured enough of it inside the body to result in cure in 60 per cent of the cases, and so with the other infectious diseases. Typhoid fever, over which we have no therapeutic control whatever, used to discourage us; it was said that we had 10 per cent mortality. We were not proud that we had a 90 per cent cure by the body's defense mechanisms.

Recall what the leukocytes do in the way of warding off infection! Every time you get a splinter in your finger you might have blood poisoning if it were not for leukocytes that come rushing to your aid and build with their bodies a wall between the attacking bacteria and the blood-stream. In an appendix operation think of the millions and millions of leukocytes organized around the appendix to wall it off and so to defend the peritoneum. Young men, such as I see before me, cannot realize as I do the former feats of the body in surgery. I wonder if anyone here has ever seen an appendix extracted through the abdominal wall by the wisdom of the body, without surgery. I have. You have all seen, I suppose, an appendix abscess evacuated through the rectum by the surgery slowly but efficiently done by the healing powers of the body.—"The Wisdom of the Human Body," by Richard C. Cabot, M.D., from *The Diplomate* for January, 1938.

Persistent Suprapubic Urinary Fistula Complicated by Multiple Bladder Calculi and An Associated Diverticulum

PHILIP A. WITT, D.O.
Denver

The operation of cutting for the stone is one of the most ancient of all operative procedures. More than five hundred years before that "scourge of God," Attila the Hun, and his barbarian horde, swarmed out of Asia and laid waste the greater part of the civilization of Europe, Celsus[1] was performing the operation at the great school at Alexandria, in Egypt. His operation, in brief, consisted of pulling down the stone toward the perineum by the finger in the rectum. An incision was then made directly upon the stone which was extracted with forceps. This was known as the "apparatus minor," because very few instruments were needed in its performance. He states the operation was particularly suited for boys below the age of fourteen. In the seventh volume of his "De Medicina,"[2] translated by Lee, Celsus warns that, "Precipitation in this operation would be incompatible with the danger inseparable from it. Neither is it to be tried at all seasons, nor in every age, nor in every case, but in spring alone." Celsus then describes the number of persons required to hold the victim, as follows: "But whether one or two persons hold him, they are to lean with their breasts over his shoulders. . . . Beside these, two strong persons should be placed, one on each side of the assistants who hold the boy, to prevent either one or both from giving way." Hugh Cabot[1] observes, "The tortures of the patient can well be appreciated."

During the next fifteen hundred years the technique of Celsus' operation remained unchanged except for slight variations of the incision. No substantial addition was made until the year 1533, when Marianus[1] described an operation which followed the same general lines in that it was of the perineal type. His was a great improvement, however, in that a staff was introduced into the urethra thus facilitating the accuracy of the incision which was made in the median line, probably dividing the tissues of the bulb. This operation was known as the "apparatus major," because of the multiplicity of instruments. During those intervening fifteen hundred years, surgery as well as the other arts was lost in that ecclesiastical fog of the Dark Ages. The Church had decreed human dissection to be a desecration, and, therefore unholy. It was not until long after John Gutenberg printed his first Bible (1438-1450) that a scientific approach born of fairly accurate anatomical knowledge was made.

According to Cumston,[3] the first suprapubic operation for the extraction of a stone was performed by one Franco, of Lausanne, in the year 1556. His patient was a child who made a good recovery. Franco, however, did not consolidate his gain. It was not until 150 years later (1718 A.D.) that the advantages of Franco's operation became apparent. It was in that year that James Douglas,[7] of England, presented a paper in which he pointed out the advantages of the suprapubic operation. Instead of taking up with Douglas' ideas, the lithotomists of England, with one exception, rejected them in toto. The exception was a man named Cheselden, surgeon to St. Thomas' Hospital. Following his example, Douglas' teachings rapidly gained not only in England, but also on the continent.

One cannot help but speculate upon the number of persons who suffered agonies during all those hundreds of years "from their infernal torments." (Bladder calculus was much more common in past centuries than it is today.) William Doolin,[4] writing for *The Irish Journal of Medical Science* states, "Our literature is rich in eloquent tributes to the anguish caused by the presence of a stone, and the social history of Europe has been affected by its incidence amongst legislators." He further states, ". . . Had Napoleon III not been distracted by successive attacks of calculous cystitis there would never have occurred that succession of political mishaps and indiscretions of which Bismarck made such opportune use in '70, thus paving the way for the unhappy state of Europe today."

Admirers of Samuel Pepys,[5] of "Diary" fame, "will call to mind the yearly entries . . . under date of March 26th celebrating each anniversary of his successful operation in terms of naive thanksgiving. . . . In his own family, we know from the 'Diary' that his mother, his brother Tom, and an aunt were fellow sufferers. . . . The first reference to this . . . is under date of 26th March, 1660, and reads; 'This day it is two years since it pleased God that I was cut of the stone at Mrs. Turner's in Salisbury Court. And did resolve while I live to keep it festival, as I did last year at my house, and for ever to have Mrs. Turner and her company with me.' (i, 93)"

Montaigne,[6] poet and essayist, who was the possessor of a stone, found it difficult to believe that his affliction was of an hereditary character. In his "Essais,"[6] he says, "It may be supposed that I am indebted to my father for this stony quality; for he died exceedingly tormented with a great stone in his bladder. . . . I was born five and twenty years before his sickness, and during the course of his healthy state, his third child. Where was all this time the propension or inclination to this defect hatched? And when he was so far from such a disease, that light part of his substance wherewith he composed me, how could it for her part beare so great an impression of it . . . that fortie five yeares after, I have begunne to have a feeling of it? . . . He that shall resolve me of this progresse, I will believe him as many other miracles as he shall please to tell me."

Montaigne further complains of his disability, and quaintly wishes that he might be rid of his infirmity in the following words: "O, why have I not the gift of that dreamer, mentioned by Cicero, who dreaming that he was closely embracing a yong wench, found himself ridde of the stone in his sheetes! Mine doe strangely dis-wench me."

In Pepys[5] diary under the date of June 1, 1664, he finds himself facing the same situation which confronted the subject of this case history, i. e., stones were again forming in his bladder (six years after his operation). We quote him: "Mr. Hollyard came

to me, and to my great sorrow, after his great assuring me that I could not possibly have the stone again, he tells me that he do verily fear that I have it again, and has brought me something to dissolve it, which do make me very much troubled, and pray to God to ease me. (iv, 138)"

Doubtless, a high percentage of those who survived the crude surgery of that time for bladder calculi had permanent fistulas such as the one about to be described. In addition to their fistulas, in all likelihood the majority suffered a recurrence of their original condition, i. e., stones formed again in the bladder.

In a cursory search of the literature upon the subject of bladder calculi, in the hope of finding a case that might in some degree parallel my patient's efforts in the direction of self treatment, I discovered only one that is deserving of mention. It differed from this case in that the means was surgical rather than mechanical. In 1651, a Dutchman, one Jan de Doot,[4] who, tortured with the agonies of a bladder stone, took a sharp knife and plunged it into his lower belly, and extracted his own stone. In the German National Museum, at Nuremberg, is a copper engraving of the knife and the stone. On the margin of the engraving, the episode is described in verse, a free translation of which runs as follows: "In the year of Our Lord 1651, urgent necessity gave Jan de Doot the courage with a painful stab in his body to draw without faltering this stone through the incision in his belly with God's help on the fifth day of the fourth month."[4]

According to Sanford,[7] who wrote a scholarly treatise upon bladder calculi, crushing of bladder calculi with instruments "was said to have been known to Ammonius of Alexandria about 230 B. C. . . . two Italian physicians, Santonio and Cinci,[7] in the seventeenth century invented instruments and were famed for crushing stones. Their method, however, was not generally known or employed. It was Jean Civiale[7] of Paris to whom the credit for putting the operation of lithotrity on a sound basis is generally ascribed. . . . In 1824 he performed his first lithotrity on a living patient with an instrument he called a litholabe."

Continuing, Sanford[7] says: "Civiale met bitter opposition from his contemporaries . . . [however], at the close of his career, [he] published in 1864 a summing up of his life's work in which he pays his respects to his detractors. He states: 'Nearly every scientific discovery is retarded not only by those who fail to recognize progress because their observation of the past has taught them nothing, but also by those whose interest it is to discourage any new accomplishment even though the evidence of its worth is convincing.'" I believe this last statement of Civiale is worth remembering.

The scientific management of bladder stones by means of the lithotrite dates no further back than 1878, when Henry Bigelow,[7] (1816-1890), of Boston, perfected the lithotrite and an evacuator. Within two years' time his method had reduced the operative mortality from 23 to 2.4 per cent. In all likelihood, historians will date the scientific approach from about the turn of our present century. It was then that the cystoscope made its appearance. All of our really accurate diagnostic knowledge of the urogenital system has been accumulated since that time. There is no branch of the healing art wherein a more accurate diagnosis can be made than in diseases of the urinary tract. The cystoscope, x-ray, kidney tests of excretion and retention, animal inoculation, the microscopic study of segregated specimens—all combine to make the urologic study one of great accuracy.

The following case history is deserving of being reported for two reasons only—first, the efforts of the patient at self-treatment; second, the obstructive element was not discovered and appreciated by the surgeon first seeing the case. The fact that the suprapubic fistula persisted over such a long period at once suggested inadequacy of the bladder outlet. It is quite impossible to keep such a fistula open if drainage is adequate through the natural passage. That fact is very elementary and should be well known and appreciated by all surgeons, and especially urologists. It, therefore, seems quite remarkable that the surgeon who created the first opening in the bladder should subsequently make two attempts to close it without investigating the internal urethral meatus. In the light of the history which the patient gave us, I was inclined to think that the obstruction was of congenital origin. It seems probable that this obstruction was the original etiological factor concerned in the formation of his calculi, since other members of the family, living under the same circumstances, failed to develop them.

CASE REPORT

Principal Complaint: Urinary retention of nine months' duration, plus bladder calculi.

Present Illness and Personal History: The patient's condition dated from the summer of 1930 at which time he passed some blood. Upon examination by a urologist, many bladder stones were found. In July, 1930, he submitted to surgery. The bladder was opened suprapubically and the stones removed. Since that time, the patient has had a persistent suprapubic fistula. He has submitted to the same surgeon upon two occasions for operative closure without benefit. He was considerably worried because of these failures, and stated that he had resigned himself to the condition, probably of life-long duration. Since his last operation, stones again had appeared in the bladder and had been present for the past three years. Retention had been present for the past nine months. He had been catheterizing himself under what he considered aseptic conditions; viz., he boiled his catheter each time, and following each catheterization instilled a few drams of a boric acid solution. A physician in the nearby countryside described to him the general mechanics of a lithotrite. From the doctor's meager description, he proceeded to construct a very acceptable instrument from a hay rake tooth and a pitchfork tine (Fig. 1). The instrument attests considerable skill and inventive ability on the part of the patient. In construction, it resembles closely the mechanical aspects of a modern lithotrite, in that it has male and female parts, adapted to each other in such a way as to prevent waggling of the jaws. The jaws had been nicely serrated to assist in grasping the stones more firmly. With this instrument the patient had crushed and passed some of his bladder stones. The patient stated that he believed he had a diverticulum, and that it contained a stone, basing his opinion upon the fact that he had secured in the grasp of his lithotrite a stone, which, when traction was applied to the lithotrite, seemed to be firmly attached to his person. He reasoned that it must be incarcerated.

Family History: The patient is one of four brothers and one sister, who came into the Oklahoma "strip territory" in 1902 when the country was opened up. All the brothers and the sister are living and well. The mother and father died many years ago in Texas of natural causes. The patient was the only one of the family who was not strong and perfectly well. His farm is located in the heart of the Dust Bowl where the only water to be had is of an extremely hard character.

Fig. 1.—Lithotrite constructed by the patient from a hay rake tooth and a pitchfork tine.

Physical Examination: The patient is an exceptionally intelligent man, apparently a few years younger than his chronological age, fifty-two. He is 73 inches tall, and weighs 155 pounds. His bearing, speech, demeanor and habits suggest English extraction. His appearance belies the rough outdoor life of hard labor which has been his lot. Examination of the scar above the symphysis revealed a small opening from which urine escaped. The remainder of the examination was eventually negative. Urinalysis was negative except for a considerable amount of pus.

Because of the history which the patient gave, a cystoscopic examination was performed as follows: Urethra was anesthetized with 2% Nupercaine solution. A No. 24 cystoscope was passed into the bladder without difficulty. After clearing the viscus with sterile water, examination with the lens system revealed several stones lying free in the bladder. On the left side, near the left ureteric orifice, and immediately above the latter, a dumb-bell stone, half of which was lying within a diverticulum, was observed. Efforts to dislodge or move it with the beak of the instrument were unsuccessful. The instrument was withdrawn, and the patient moved to the x-ray room where a flat negative was made revealing fourteen stones, thirteen of which were lying free in the bladder. The fourteenth was incarcerated in a diverticulum about the size of a dollar (Fig. 2). The bladder was then filled with a sodium iodide solution and x-rayed from several angles to verify our finding of the dumb-bell stone in the diverticulum. The x-ray revealed the stone to be entirely filling the diverticulum.

Diagnosis: Multiple bladder calculi, plus a diverticulum.

Recommendation: Surgery.

After hospitalizing the patient, an indwelling catheter was introduced and continuous drainage instituted. Lavage with a 1-1500 acriflavine solution was carried out morning and night for two days prior to the operation. At this time a P. S. P. test of excretion was made. In two hours, the patient returned 68 per cent of the dye. Blood urea was 14.08 mg. and creatinine, 1.5 mg. per 100 cc. of blood. The patient was urged to drink water and other fluids freely. A pitcher of water, and one of fruit juice, was at his bedside continuously. To the fruit juice was added three tablespoonsful of Karo corn syrup (glucose) to each pint of fluid. On the third day of hospital residence, he was taken to surgery.

Anesthetic: Spinal.

The fistula was injected with a solution of methylene blue to make easy its identification as dissection progressed. The old scar was removed by sharp dissection, carefully following the tract of the fistula. Those stones lying free in the bladder were easily removed by hand. In removing the dumb-bell stone from the diverticulum, situated near the bladder orifice of the left ureter, sharp dissection was required to loosen the tissue about its neck. After delivery, the diverticulum was disposed of as follows: A No. 6 ureteral catheter was introduced into the bladder orifice of the ureter and pushed up a distance of 8 or 10 cm. in order to facilitate continuous identification of the ureter and prevent its surgical injury. It was necessary to preserve a portion of the floor of the diverticulum in order to accomplish this end (Fig. 3). A crescentic piece of tissue was removed from the middle of the concavity of the diverticulum 1 cm. away from the bladder meatus of the left ureter. Repairing the defect of the bladder wall was then accomplished by bringing the edges of the crescent together with continuous No. 00 chromic cat gut (Fig. 3). This part of the operation is described by H. H. Young, M.D.[8] Ac-

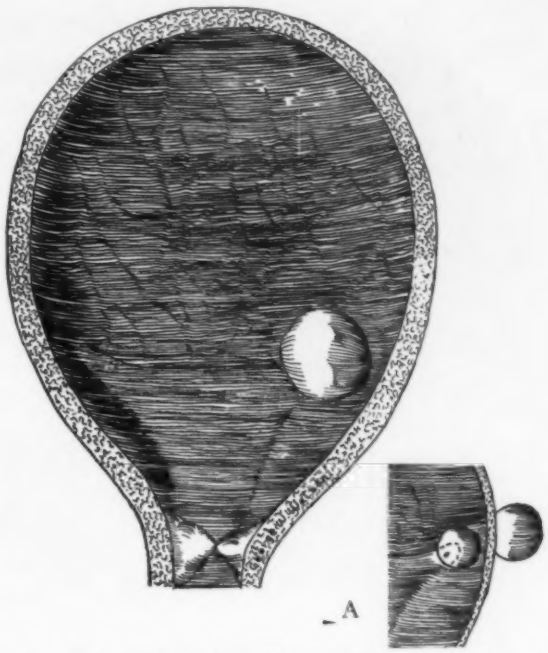


Fig. 2.—Illustrating bladder with stone occupying diverticulum and overriding the left ureteral orifice. "A"—semilateral view of the stone and diverticulum.

cording to Frontz[9], "a series of more than thirty-five similar diverticulectomies have been done at the Brady Clinic by Young's method. Ureteral transplantation has never been found necessary, nor as far as we know has the ureter been injured." Their technic, as described[9], did not include the instillation of the ureteral catheter, which I feel is of material assistance in preventing surgical injury to the ureter.

When the case was first described to me in a letter by the referring doctor (O. C. Kappler, D.O., of Liberal, Kansas), it seemed obvious that the reason the suprapubic fistula remained open so long could be attributed to only one thing—obstruction to the urinary outflow. Therefore I assumed that a degree of prostatism must be present. Rectal examination failed to confirm this assumption. With the bladder opened, it was not difficult to see why the fistula had never closed. About the bladder orifice there was a rigid fibrositic ring of tissue almost encircling it. This deformity is sometimes described as a "horse collar" obstruction. The opening of the collar pointed toward the left trochanter. With an open loop attached to the radio knife, this fibrosis was removed (Fig. 4). The bladder was closed in layers in the usual manner, interrupted No. 1 chromic for the musculature followed by a continuous line of No. 1 chromic overlapping the interrupted. A No. 35 pezzer catheter was left in place for suprapubic drainage. Care was exercised to slope the pezzer toward the umbilicus and allow it to emerge from the fundus of the bladder. Skin was closed with Michel clips, except for two silkworm gut interrupted near the pezzer. An indwelling catheter was left taped in place for a few days, and drainage was allowed to escape in either direction. The patient was given a venoclysis of N/S, 1000 cc. with 10 per cent glucose upon his return to his room. Thereafter, he received 50 cc. glucose intravenously daily. The patient was able to ingest on an average of 3000 cc. per oram every 24 hours. His first postoperative day he eliminated 2500 cc. He rested well that night. Temperature was 98, pulse 86, respiration 16. Convalescence was uneventful. The lower indwelling catheter was removed on the fifth postoperative day.

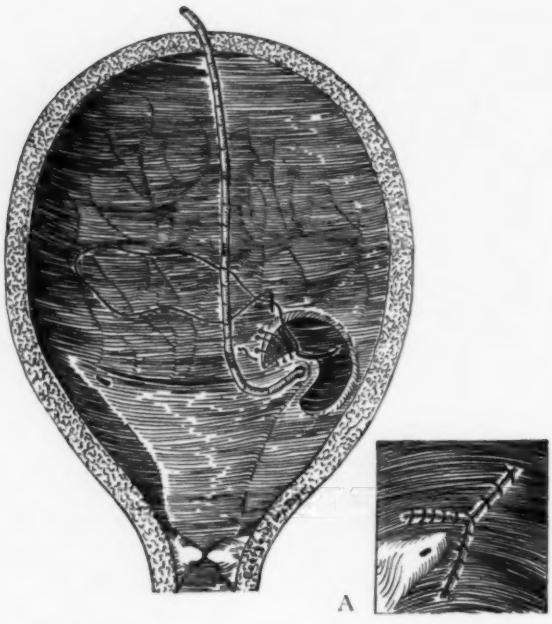


Fig. 3.—Illustrating the diverticular defect after delivery of the stone and after removal of the elliptical piece of tissue from the concavity. The urethral catheter is shown in situ, also the method of surgical repair (After Young[8]). "A"—appearance of the defect after closure.

For fear of having left some part of the obstruction behind and because of the fact that I am more familiar with the bladder orifice when viewed through the telescopic lens of a cystoscope, I decided to review the work performed with the radio knife, and to remove any tissue that might in any way obstruct the urinary outflow. On the fourteenth postoperative day, patient was returned to surgery, at which time the bladder neck was resected by means of a Stearns-McCarthy Resectoscope, activated by radio knife. (The site of the first operation (diverticulum) was observed to be entirely healed.) Three and one-half grams of additional tissue were removed. At the end of the operation, a lubricated No. 32 sound was passed into the patient's bladder by its own weight. The lower indwelling catheter was again installed and drainage both above and below was continued. The urine cleared at the end of the third day, at which time we removed the pezzer catheter from the bladder in the abdominal wound. The wound was cleansed, a thin sterile dressing applied, and, above this, we taped firmly in place an ordinary soft, porous, rubber bath sponge. Because of the angle at which our tube emerged, we were able to secure prompt approximation of the walls of the outlet. The suprapubic wound closed in seven days. The indwelling catheter was allowed to remain in place for a total of fourteen days, with frequent removals for resterilization, and at the end of that time we again filled the bladder with acriflavine solution and then removed the catheter. The patient voided spontaneously for the first time in nine months, and without effort. We installed the catheter for an additional four days to allow the scar in the suprapubic wound to become more dense and to prevent overdistention of the bladder until healing was thorough. The patient was discharged on the forty-fifth day of hospital residence.

It is now more than a year since the operation was performed. Since that time, I have had several letters from the patient and his doctor, saying that he could void a good stream and that his abdominal fistula had remained entirely closed and dry. The last of his letters, I quote:

Fig. 4.—Illustration of bladder sectioned through its long axis, showing resectoscope in position and the approximate location of fibrosis at the internal bladder meatus.

I am feeling as well as I could wish as far as the bladder is concerned. The incision has been closed all these months. There is very little tenderness. I am able to carry 12 oz. of urine with perfect ease. Have never been bothered at any time with incontinence, and the urinal passage is open as it should be. In fact, am able to empty the bladder with more ease than at any time in nearly thirty years. Seems to be no sign of stones forming now. Bothered with some constipation, also slight indigestion, but with proper care hope to overcome both in time. I have a very good appetite. Have gained 15 pounds since the operation.

In regard to the lithotrite, you may keep it as long as you wish to do so. I, perhaps, will never need to use it again, but just want to keep it as the saying goes, "For the good it has done." Any time you are through with it, you may return it to me.

1550 Lincoln St.

REFERENCES

1. Cabot, Hugh: Modern Urology. Vol. II. Ed. 3. Lea and Febiger, Philadelphia, 1936.
2. Barney, J. Dellinger: Lithiasis in "History of Urology" by American Urological Association, Vol. II. The Williams and Wilkins Co., Baltimore, 1933.
3. Cunnston: Tr. Am. Urol. Assn., 1912, vi. 304-337. Referred to by Barney, *ibid.*
4. Doolin, William: Some Antique Stones. Irish Jour. Med. Sc., 1936 (Dec.) 132:709-721.
5. The Diary of Samuel Pepys: Wheatley's edition, Bell, 1926. Referred to by Doolin, *ibid.*
6. The Essays of Montaigne: Florio's translation, Dent., 1923. Referred to by Doolin, *ibid.*
7. Sanford: Journal of Urology, 1924 (Feb.). Referred to by Barney, *ibid.*
8. Young, H. H.: Young's Practice of Urology. W. B. Saunders Co., Philadelphia, 1926.
9. Frontz, William A.: Nelson's Loose Leaf Living Surgery. Vol. VI. Allen O. Whipple, Editor. T. Nelson and Sons, New York, p. 454.

Dealing with the Irregulars

(Reprinted from Clinical Medicine and Surgery for March, 1938)

The regular student at our universities, after a strenuous and expensive course of study, after giving up 7 or 8 years of his life, is sent out to compete with other men who call themselves Doctors, and are recognized as such by many of the States and by the people in general . . .

There is but one way that these matters can be overcome. Not by ignoring these sects, which are increasing as time goes on, but by teaching in our regular universities the methods of the irregulars *and by making the course compulsory.*

Legislation only stimulates the irregulars to greater efforts, and when it fails, as it has time and again, it only tends to strengthen the hands of those opposed to us as a Medical Fraternity.

Teaching in our regular established universities, a reasonable course and making it compulsory, is the only way to make the healing profession a unit, instead of a hodge podge of sects as it is at present. . . .

I am quite aware that many new methods and formulae are showered upon us from day to day, of the tremendous labor attendant now in our efforts to keep in the front line, and have no desire to add to the burden by proposing unnecessary studies for the undergraduate, or additional effort for those already in practice, but I believe something will have to be done to eliminate abuses which threaten to undermine the profession to greater or less degree.—E. M. Morgan, M.D., Westmount, Que., Can.

An Essay Toward an Osteopathic Approach to Corrective Speech Problems*

FLEDA MARGARET BRIGHAM, D.O.

South Pasadena, Calif.

PART III

SPEECH DISORDERS AMENABLE TO OSTEOPATHIC MANIPULATION

I. DYSARTHRIA

Dysarthria is "a speech disorder due to innervation disturbances of articulation associated with trauma, inflammation, degeneration or agenesis of the brain or peripheral nerves."[1]

Because of the variety of problems involved, a few general statements will be made. Dysarthria is important from the point of view of this thesis. Since it may be caused by cerebral disturbance, it is necessarily influenced largely by the circulation to the brain. That circulation, as shown in earlier articles, passes through the limited neck area. It has already been shown that circulatory conditions resulting in inflammation or degeneration are amenable to osteopathic manipulation. It therefore stands that any condition of the brain influencing the nerves innervating the speech mechanism or the speech center must be aided by the stimulation of circulation through the brain. It is that approach, then, that can be made in cases of functional disturbance of the following cranial nerves: hypoglossal, glossopharyngeal, spinal accessory, facial nerve (manifest usually as Bell's Palsy), and the trigeminal.

In other words, any functional disorder in the brain or spinal cord should be helped by manipulation. As Goldthwait is quoted as saying, "The neck not only carries the circulation to and from the brain, but it is one of the more movable areas of the spine and therefore the mechanics of it greatly influence the areas affected by its blood and nerve supply."

II. DYSPHEMIA

A. *Spasmophemia.*—"Dysphemia is defined as intermittent and variable nervous disorders of speech accompanying certain psychoneuroses."[2]

Perhaps the best known and least understood form of dysphemia is spasmophemia. As defined by Dr. Stinchfield, "Spasmophemia is characterized by cramps or spasmodic contractions of the muscles concerned in speech, by spasmophilia or by rapid repetition of a word or its initial letter or syllable, and is usually accompanied by the fear of becoming ridiculous."[3] Spasmophemia may take the form of clonic or tonic muscular contractions called stuttering or stammering. Stuttering will be used throughout this thesis as synonymous with spasmophemia.

History.—The history of stuttering is practically parallel with medical history. Past records show cures from stuttering by almost as many means as there have been individuals who have studied it.[4]

Bluemel gives an interesting résumé of some of these theories. To show the attention it has received during the last 2,000 years, he says it was discussed by Hippocrates, Aristotle, Plutarch, Cicero, Galen and others.

According to Hippocrates, stammerers with voluble tongues were full of black bile. Galen thought that stammering was caused by a debility of the muscles from diminution of heat. Avicenna believed that humidity caused mallification of the tongue. Guyde Chauliac contended that there was too large a quantity of humors affecting the nerves, muscles, and substance of the tongue. Bacon thought that stammering was caused by refrigeration of the tongue, whereby it was less apt to move. He recommended that stammerers drink wine moderately "because it heateth." Even in the nineteenth century the tongue was thought to be the seat of the stammerer's difficulty. The tongue was said to lie low in the mouth. Dieffenback, a German surgeon, undertook to elevate the tongue by removing a transverse wedge, then sewing the edges together.[5]

The ideas of etiology and theories of treatment of the disorder are determined by the general scientific advances of the day as are the present ideas of cause and treatment. The research which has been done in this field in the present century is more complete, though still in an unsettled stage, because scientific investigation has become better established. Bluemel discusses stammering in his most recent book "from the point of view of psychology and neurophysiology."[6] He briefly reviews some of the more modern theories of stammering which furnish a clearer conception of possible osteopathic approaches.

In 1913 Bluemel suggested that stammering is the result of "transient auditory amnesia."[7] According to this theory, the individual cannot clearly hear the word in his mind. In 1930 Bluemel clarified his theory by explaining that the amnesia is not necessarily due to the natural weakness of the memory for sounds, but to a recoil of the thought from the mind.[8] In 1936 Bluemel wrote on stuttering as an inhibition of the conditioned reflex which is normal speech.[9]

In 1915 Swift published his theory that stammering is due to the "loss or diminished power of visualization."[10]

Fletcher[11] advocates the theory that fear is the cause of stuttering—a psychological approach to the problem and treatment. It is an opinion held by many mental hygienists today; by Dr. J. F. Halls Dally, an English physician; by Fredrick W. Brown, of the National Committee for Mental Hygiene; by Freud.[12]

Travis has written concerning the dominant gradient theory in its relationship to left-handedness since he found the left-handedness to be commoner among stutterers than among non-stutterers.[13]

Fletcher[14] discusses these and other theories of stuttering. He relates the fact that Freudians have attempted treatment of the condition but have apparently been unsuccessful because the mental mechanisms which underlie stuttering seem to differ from those of the psychoneuroses in general; and that,

*Thesis presented to the Faculty of the School of Speech, University of Southern California, in partial fulfillment of the requirements for the Degree of Master of Arts, May, 1937. Part I was published in THE JOURNAL for February, p. 271, and Part II in March, p. 289.

though the trouble may begin in the Freudian manner of repression, complexes, etc., this simply forms a "neuropathic background out of which stuttering may or may not arise."[15] He also discusses psychological theories such as the association diagnosis of Appelt, Tomkin's voluntaristic theory, and others.

Fletcher gives, too, a review of the physical and physiological nature and cause of stuttering. A. A. da Casta Ferreira writes of stuttering having an endocrine origin.[16] The physiological theory has been suggested. Becquerel had a theory of abnormality of breathing as being the cause.[17] More recently the biochemical theory has been developed by Kopp.[18]

A report from the University of Michigan suggests that stuttering may be due to reflex stimulation causing a "temporary dilation of the capillaries of the precentral cortex."[19]

Leonard Robert Frankel discusses the theory of regression.

> The theory of regression is applicable to all dysfunctions of the human organism of a retrograde nature and hence is especially valuable in the estimation of stuttering, aphasias, dysfunctions of writing and spelling.[20]

Kenyon says that stammering is a manifestation of faulty speech development, that it must be considered as a physiologic and psychologic phenomenon.[21]

This, then, gives a brief review of the theories of stuttering, showing the diversity of opinion on the subject. It will be the purpose of this chapter to discuss the possible osteopathic approach to the last three of these theories—reflex, retrogression, and faulty development.

The general assumption underlying the future discussion is that

> No amount of pure psychical disturbance, as such, can possibly constitute an explanation of stammering unless connection between psychical disturbance and muscular perversion be also made clear.[22]

Before discussing any particular theory of stuttering, the mental aspect of the disorder will be briefly considered. Mental shock or stress or some form of abnormality is usually mentioned in connection with stuttering as was seen in the outline of its history. In speaking of the nervous system, Goldthwait says that the close relationship of the mental states to the state of health of the body is becoming more apparent.

> Moreover, fatigue and cerebral congestion, inevitable concomitants of faulty Body Mechanics, are frequently the cause of irritability. . . . In local sanataria the common association of faulty Body Mechanics with psychoses and the improvement in the milder aberrations by correction of the faulty Body Mechanics has offered very suggestive evidence of a causal relationship.[23]

Therefore, any case of stuttering should be aided by osteopathic manipulation directed toward articular and soft tissue lesions and circulatory stimulation.

Kuntz,[24] too, shows the effect of emotional states on the respiratory system and the larynx and pharynx through the reflex association with these organs.

B. *Three Theories of Stuttering.*—(1) Theory of reenforcement of reflexes: A very interesting account of twenty-four cases of stuttering studies in the biolinguistic laboratory of the University of Michigan appears in *Science*.[25] The report states that

> A marked improvement, even to a complete cessation of stuttering was noted when the stutterer spoke while walking on all fours. When the stutterer assumed this position the arrhythmia and lack of coordination decreased.[26]

It further stated that no explanation is to be made as yet; that it is . . .

> conceivably due to the reenforcement of reflexes.
>
> . . . More specifically, stuttering may be caused by a temporary stimulus to an upper motor neuron. This might be due to a temporary dilation of the capillaries of the precentral cortex. By the assumption of the quadrupedal position an alteration of blood pressure possibly ensues, which releases the blood that dilates the capillaries. Hence, the spasticity ceases and the patient carries on a more nearly normal conversation.
>
> If this view proves correct, then present theories and methods for correcting stuttering should be revised and greater effort should be made to place them upon a physiological basis.[27]

This is an interesting finding in light of the principles of body mechanics as discussed, for surely it is through that avenue that results were obtained.

In the assumption of the quadrupedal position, the physical elements of fatigue and endocrine imbalance would tend to be overcome or normalized. All functioning would be on a more stable level. Because of the normalizing of nerve impulses and circulation, the psychological elements would be considerably aided.

(2) Theory of regression: Leonard Frankel[28] bases his theory of regression upon the fact that,

> Every organism has a given level of stability . . . that those functions arising earliest have an inherently higher level of stability and require a comparatively low level of stability in the organism in order to function. Also, that those functions arising the latest, comparatively, have the lowest level of stability and therefore require a comparatively high level of stability in the organism in order to operate. Thus there is visioned a series of functions, each of which possesses a quantitative level of stability depending upon its precedence of emergence in the evolutionary ascent of the organism.
>
> We have, therefore, a hierarchy, functionally speaking, pyramidal in structure, in which each function depends upon the preceding.[29]

He further explains that stability may be said to have a threshold, physiologically, and that when, as in stuttering, the organism is exposed to an unstabilizing influence which forces the level of stability below the threshold, it regresses to a more stable level. The unstabilizing factors may be psychological or physical.

(3) Physical and psychical consideration: Kenyon[30] gives consideration to the physiological and psychological considerations of stuttering. He says that he believes the peripheral phenomenon of stammering to be perverted muscular movements due to a psychical disturbance not allowing proper neurological command of the peripheral organism.

> No amount of pure psychical disturbance, as such, can possibly constitute an explanation of stammering, unless connection between psychical disturbance and muscular perversion be also made clear.[31]

He says that in articulation, the intrinsics and extrinsics have to work together. When one is out of tune, they are all out of tune. The psychical development is a matter of the education of the motor word center. A number of years is required to develop this store of neuromuscular activities. Speech is not a separate entity but becomes the active medium for thinking and the expression of thinking. Further,

there is, coupled with this, an emotional factor in stuttering which may be stage fright or shyness. The speech defective becomes mentally altered. The muscles of the throat become tense.

Coupled with this idea is a study made by Grant Fairbanks[32] in which he shows that at two years of age the speech mechanism is relatively unstable and that sound acquisition tends to follow the path of least resistance. Correlation, he has found, between the initial sound difficulty for the two year old and the initial sound difficulty of stuttering is significantly positive. He concludes by saying that sounds most difficult for the two year old tend to break down, frequently resulting in stuttering.

This same conception is held by Mrs. Hill Young in her work with nursery aged children.

This consideration might well be another phase of the same idea of functional development. In other words, with so many theories of stuttering and yet with fair results obtained by the treatment under each theory, there may be some etiological factor common to all. If it can be assumed that the conception of recent function may be that factor, these three reports would explain many phases of the problem.

C. *Relationship of Stuttering to Faulty Body Mechanics.*—These three considerations appear very interesting in the light of the previous considerations of body mechanics. It would seem that all three of these suggestions might well be considerations of the same fundamental conception that lies at the basis of the correction of faulty body mechanics by exercise and osteopathic manipulation.

Turning for a moment to a consideration of the exciting cause of stuttering, it is found to be, in many cases, a sudden shock or fright or emotional stimulation.[33]

The possibility of this is borne out by neurological findings. Kuntz[34] explains how emotional stress causes visceral manifestations. He explains how severe shock may be the etiologic factor in the precipitation of hyperthyroidism and in other functional disturbances. Goldthwait[35] says that there is a realization of "the close association of the efficiency of the so-called mental states to the state of health of the body."

Is it not logical to suppose, in the light of previous discussion, that the sudden severe emotional or mental shock precipitates stuttering because the function of these organs used for the purpose of speaking was the last to develop? This would account for some of the individual variations found among stutterers. It would suggest a reason for the difficulty in overcoming the habit.

In the light, then, of this explanation, the assumption of the quadrupedal position would be effective because it would be placing the individual in a more primitive functional attitude.

In the erect position, the weight of the body falls to a great extent upon the bodies of the vertebrae and consequently upon the intervertebral discs. In the earlier position the body weight was carried primarily by the articular processes of the vertebrae. It follows that the possibility of nerve stimulation and consequent reflexes produced, as well as autonomic imbalance, would be much greater in this newer position than in the older quadrupedal position.

Therefore, in the exercises as carried on in this experiment, the autonomics tend to become normalized. Excess stimuli causing reflex reaction would tend to be lessened.

At the same time it is possible that faulty body mechanics caused cerebral congestion which made the patient more susceptible to shock. This, too, would be helped, as suggested by the "all-fours" position.

Basing the cause of stuttering, then, upon the ideas presented, it may be said to be caused by an imbalance in the autonomic nervous system created by reflexes started by stimulation from poor body mechanics and resulting in stuttering because of the instability of the function of speaking, and being induced by psychological factors.

D. *An Osteopathic Approach to the Problem of Stuttering.*—Assuming that stuttering may be considered as being a disturbance of the autonomics, as such findings show it may, it would come within the classification of pathological physiology amenable to osteopathic treatment. Leonard Frankel gives suggestions for treatment based upon this theory. First, he states, the "precipitating unstabilizing factor"[36] must be found. Among those he mentions fatigue. This would be helped by manipulation, by relaxation and circulatory stimulation.

He then states that "re-education of the organism must begin at a level below that of the function to which the organism has retrogressed in order for it to be of any permanency." He suggests that breathing be that level.[37]

The writer would suggest the probability that the success of the treatment on all fours depends upon the fact that in that position all functions connected with speaking would be at a more stable level.

The factors suggested by this discussion as to the cause of stuttering, which would be amenable to osteopathic manipulative treatment, are autonomic imbalance, reflex disturbance, the underlying factor of poor body mechanics, circulatory disturbance due to these reflexes, possible fatigue. With this there is the muscular spasm which develops. There is also the particular factor of the hyoid bone, which Kenyon said is important.[38]

The approach then, from an osteopathic point of view, would be relaxation of musculature of the spinal regions and the neck—a procedure recommended by the majority of workers in the field.[39] Correction of articular lesions would tend to normalize the autonomic system and the reflex. Particular attention should be given to the hyoid bone to normalize its position, thus normalizing the supra- and infrahyoid muscles.

Therefore, because stuttering might well fall within the realm of conditions amenable to osteopathic manipulative treatment, an osteopathic approach is pertinent.

E. *Stuttering Caused by Trauma.*—The following case histories briefly stated offer a very interesting suggestion of a possible approach to some cases of stuttering.

R. F. Lindberg, D.O., writes of the case of a stutterer who presented an acute lesion of the second thoracic vertebra. He was relieved of his stuttering within twenty-four hours after treatment—correction of the lesion.[40]

W. Curtis Brigham, D.O., reports the case of a woman forty-five years old who had stuttered since an automobile accident. Upon correction of cervical lesions, the stuttering gradually diminished. At the time of writing, she had no impairment of speech.[41]

What is the basis for such records? Is it possible that many stutterers could be relieved by such methods? Is it a psychological reaction? If so, why did it not take place more readily? Is the lesion causing reflex stimuli to the cortical areas which control the speech mechanism? Is it possible that the stimulation produced by an articular lesion was severe enough to disturb the speech mechanism? If so, is it not possible that the reason is still based upon the fact of recent functional development of the parts?

It is at least interesting to conjecture and offers a field for further investigation.

III. DYSPHONIA

Dysphonia, as the name suggests, refers to defects in voice. "This includes all disorders of phonation due to organic or functional disorders of vocal cords, or to defective respiration."[42] Further,

> Dysphonia may be defined as any defect of voice due to morbid condition of the larynx or its immediate innervation, to defective respiration, to anomalies in the resonance cavities of the throat, mouth or nose, or to dysfunction causing an alteration in the voice quality, or to inability to phonate.[43]

As can be readily seen, dysphonia includes many kinds and degrees of voice disorders which may be caused by many common as well as rare conditions.

The conditions which will be discussed under dysphonia are laryngitis, acute and chronic, latent tetany and dysphonia caused directly by faulty body mechanics.

A. *Laryngitis.*—The speech pathology in laryngitis falls under the classification of local inflammation or congestion. Since that is one of three conditions shown to be amenable to osteopathic manipulation, it becomes significant in this paper. There are two frequent and important types of laryngitis, acute and chronic. Although the general pathology is similar and in general they respond to similar treatment,[44] there are several points of difference pertinent to this paper. They will, therefore, be discussed separately.

Acute Laryngitis: The characteristic types of dysphonia accompanying acute laryngitis are temporary asphonia and trachyphonia or hoarseness. The condition is important from a speech point of view, not only because of the immediate dysphonia apparent, but also because if it is not well taken care of at the time, it may develop into a chronic condition.

This condition may appear in conjunction with adenoids, infected tonsils, coryza, sinus infection and other inflammatory conditions of the cervical region. The mucous lining of the larynx is swollen and hyperemic, accompanied usually by infiltration of the submucosa and muscles, with a lack of tension of the cords in phonation. It is more serious in children than in adults because of the danger due to comparative narrowness of the glottis and the tendency to reflex spasm.[45]

Since this is a condition of local inflammation of the larynx itself, the osteopathic approach is significant. One of the first considerations should be relaxation of the musculature especially through the cervical region. The approach should be directed toward lymphatic drainage, toward increase of the circulation through the part. Faulty body mechanics should be corrected, especially lesions of the upper ribs. This will tend to normalize nerve innervation to the larynx.[46] Stimulation in this area will also stimulate circulation and sweat glands.[47] Attention should definitely be directed toward the hyoid bone in its relationship with contracted musculature which in turn helps in regulating the vocal cord action.

Osteopathic manipulation, then, may be applied in this condition because it is a condition of local inflammation.

Chronic Laryngitis: Chronic laryngitis becomes important from the standpoint of corrective speech. It manifests itself as a rule as hypophonia (whispered voice) or trachyphonia (hoarseness). It is further important because it is often the result of acute laryngitis or of the cause of the acute form.

> Laryngitis does not always disappear permanently, with the removal of tonsils and adenoids. Singers and public speakers, after the removal of diseased tissue, often find that if they are forced to use the voice under conditions of undue strain and fatigue, hypophonia may result.[48]

Pressman describes the condition further by saying that it may begin with a slight swelling of the vocal bands, which prevents proper vibration and approximation. Injury is caused by too forceful expulsion of air to the delicate membranes. If the voice is used during this period, rupture of the blood vessels occurs followed by hemorrhage. Absorption of the blood is necessary. Organization takes place followed in many cases by scar tissue. This he calls the "pathology of overuse."[49] He continues by giving briefly the steps involved in the production of chronic laryngitis as produced especially by singers, orators, and physical education directors. Inflammation of the cords and surrounding tissues occurs. This is followed by swelling, frank hoarseness, and perhaps pain, the cords thicken and granulate, and chronic laryngitis has developed.

It can readily be seen that the osteopathic approach would be similar to that of acute laryngitis because of the similitude of pathologic physiology. If it is the result of acute laryngitis due to a focus of infection, the treatment should point toward drainage of lymph and venous blood, and increased circulation, as well as the other factors considered in the acute form.

If it has developed as a result of muscular fatigue, relaxation becomes important. The approach should also point toward a stimulation to the circulation and a normalization of the reflexes in order to help normalize metabolism and blood chemistry.

B. *Latent Tetany.*—The speech manifestation of latent tetany or spasmophilia, is dysphonia varying as to degree and type. It occurs as a laryngospasm, often a laryngismus stridulus. It becomes of special significance since it "may easily lead to the establishment of 'spasmodic speech'[50] as a permanent feature of the speech habits."[51] This condition is, therefore, one which becomes important in the correlation of the work of physician

and speech correctionist and should be treated from a preventative as well as a therapeutic point of view.

Latent tetany is produced by a diminution of the calcium content of the blood falling as low as five mg. per 100 cc. (10 mg. per 100 cc. is normal). This fall in calcium may be due, theoretically, to injury to the parathyroid glands, a disturbance in the acid-base equilibrium in the blood, intestinal abnormality preventing proper calcium absorption or the removal of calcium from the blood stream as occurs in rickets.[52] The result of this fall in calcium is a hyperexcitability of the nervous system, since it is known that the calcium ion exerts a sedative action on the nervous system, centrally and peripherally.[53] Any muscles may be involved in the spasms, particularly those of the face, eyes, tongue and larynx.[54] The sympathetic nervous system is involved as well as the motor nerves to the smooth muscles.[55]

Latent tetany is primarily a condition of altered blood chemistry affecting the excitability of the nerves. One of the three general conditions which it was found could be helped by correcting faulty body mechanics, and therefore amenable to an osteopathic approach, was that of the nervous system. Since it is the nervous pathologic physiology which produces the speech disorder in this case. it will be aided by such treatment.

The general treatment must be approached from a dietetic point of view and must include proper chemistry of the bowel in order that the calcium may be absorbed to be used by the body. An osteopathic approach should include further general muscular relaxation of the entire body. Due to local reduction in the circulatory efficiency caused by prolonged cases of tetany, the calcium and vitamin D cannot be properly used so that general relaxation and muscular manipulation will help normalize the circulation. Further, correction of body mechanics will help since it tends to normalize nerve physiology and stimulation. An approach to the muscular tension through inhibition of the sympathetics would be of great value.[56]

C. *Dysphonia Caused by Osteopathic Lesions.*—Dr. Holt gives a case history of a patient who could not speak above a whisper (hypophonia, involuntary). He found the hyoid bone to be tilted. The suprahyoid muscles were consequently tense. He relaxed the muscles, in part, by holding the tongue firmly at the base while gently moving the hyoid bone. He then straightened the hyoid by gently moving it laterally and in a vertical direction.[57]

As in the cases of stuttering, the question arises as to the number of cases of dysphonia caused by faulty body mechanics alone. It would seem logical that the hyoid would be susceptible to conditions causing faulty body mechanics the same as other parts of the body. Due to the peculiar anatomical features of the hyoid,[58] one would be led to believe that it might be even more susceptible since it is almost entirely suspended by such a great number of muscles[59] functioning so continuously.

PART IV
SUMMARY AND RECOMMENDATIONS

This, then, has been an essay toward an osteopathic approach to certain corrective speech problems. It has reviewed the principles upon which osteopathic manipulation is based. It has stated the relationship of faulty body mechanics to the muscular, circulatory and nervous systems showing that it results in pathological physiology. By showing that the osteopathic lesion is a detailed entity of faulty body mechanics and, as such, is therefore subject to the conditions of poor mechanics, and by showing how osteopathic manipulation aids in the correction of such faults, the premise has been established that pathological physiology due to faulty body mechanics is amenable to osteopathic manipulation. The altered physiology of the speech mechanism which can be normalized by the correction of faulty body mechanics and therefore aided by osteopathic manipulation was discussed.

There has been no attempt at presenting a paper on the anatomy or physiology of the speech mechanism. Nor has there been an attempt at presenting an exhaustive study of all the effects of poor body mechanics or all the aspects of the correlation of body systems. Neither has there been attempted a description of the specific manipulative technics which might be used in certain speech disorders, nor a discussion of the alleviation of the disease or pathology responsible for the speech pathology.

The conclusions reached by this study are several. There is an osteopathic approach to certain classes of speech disorders. Through osteopathic manipulation, a very real contribution can be made toward the solution of very real problems. Because of the possibilities, a study might well be made of a sufficient number of speech defectives in each case named, marking out definite technics to be used toward the speech difficulty. Out of such a study might be evolved a pattern of treatment to be found of definite value in those cases. This would be treatment to be given by an osteopathic physician along with his other therapy for the condition as well as treatment to be used by him in conjunction with the speech correctionist.

A study might also be made of the causal relationship of specific osteopathic lesions to the problems of stuttering and dysphonia. Do case records show a number of instances similar to the ones mentioned? In a series of cases of speech defectives, can the correction of specific lesions be found to aid in overcoming the disorder?

Correspondence with Deans and heads of technic departments of various osteopathic colleges shows that little work has been done in this field.

> Our institution has never been engaged in corrective speech problems, our clinics not being physically equipped nor of sufficient size to warrant the inclusion of a defective speech clinic.[60]

Since there is seen to be an application of the principles of osteopathy to problems of the speech defective, it offers an opportunity for further study.

It can be readily seen from this statement and from the scarcity of material on the subject in osteopathic literature that the field is open to investigation. And while no constant lesion may be found in these cases,[61] it is true that help has been, and may be, given by the application of osteopathy as suggested in previous chapters. Surely, evidence shows that any one of these con-

ditions might well serve as the basis of further study, of research theoretical and practical in an attempt to offer further aid to speech defectives. Some, or indeed all, of the suggestions here made may prove incorrect or ineffective. At least, the implication is such that research in these problems is warranted.

The indications for a therapeutic approach to some of these problems through the autonomic nervous system suggest very interesting possibilities in extensive research along these lines. Active muscular exercise produces acidosis. Heat applied to body tissues induces alkalosis. Passive manipulation or soft tissue manipulation produces neither, at the same time causing an increased hemaglobin percentage and erythrocyte count.[62]

What, then, are the detailed possibilities of the control of some of the visceral functions through the medium of inhibition and stimulation of the autonomic nervous system, not by a change in the chemistry of the body such as accompanies active exercise as suggested by Goldthwait, or by thermal treatment as applied by moist heat, radiothermy and the like, but by the use of passive stimulation and inhibition as developed in osteopathic manipulation? Perhaps, in the case of stuttering, the basis of the emotional sensitiveness which is stimulated by certain social situations is fundamentally a factor of a sympatheticotonia.[63] Perhaps this forms the basis for Kenyon's description of the disorder.[64] Perhaps it is instrumental in the biochemical theory reported by Kopp.[65] It is possible that there is no one factor which is common to all stutterers. Each person is an individual differing from all others, and for that reason, reacts differently from all others mentally, spiritually, and physically. What part does the autonomic nervous system play in this individuality? It is closely linked with the glandular system.[66] The glands are so closely allied that it becomes difficult to determine which is instrumental in causing the reactions being studied.[67] Further, there is a functional significance of the innervation of sympathetics to the skeletal musculature.[68] Can this be pertinent to the peripheral organs of speaking? At least, this is a challenging problem and might well be more thoroughly approached from the osteopathic point of view.

This thesis, then, has developed the concept of an essay toward an osteopathic approach to corrective speech problems, and suggested recommendations for further study in this field.

1711 Monterey Road.

REFERENCES

1. Stinchfield, Sara M.: Speech Disorders, A Psychological Study of Various Defects of Speech. Harcourt, Brace and Co., New York, 1933, p. 80.
2. Stinchfield: *Ibid.*, p. 116.
3. Stinchfield: *Loc. cit.*
4. Fletcher, John Madison: The Problem of Stuttering. Longmans, Green and Co., New York, 1928, pp. 89-168.
5. Bluemel, C. S.: Stammering and Allied Disorders. The Macmillan Co., New York, 1935, pp. 1-2.
6. Bluemel: *Ibid.*, p. 3.
7. Bluemel: *Ibid.*, p. 108.
8. Bluemel: *Ibid.*, pp. 109-110.
9. Bluemel: *Ibid.*, p. 111.
10. Bluemel: *Loc. cit.*
11. Fletcher: *Op. cit.*, p. 362.
12. Bluemel: *Op. cit.*, p. 118.
13. Travis, Lee Edward: Speech Pathology. D. Appleton and Co., New York, 1931.
14. Fletcher: *Op. cit.*, pp. 89-168.
15. Fletcher: *Ibid.*, p. 154.
16. Fletcher: *Ibid.*, p. 97.
17. Fletcher: *Ibid.*, pp. 98-99.
18. Kopp, George A.: Metabolic Studies of Stutterers: (1) Biochemical Study of Blood Composition. Speech Monographs, 1934 (Sept.) 1:117-132.
19. Geniesse, H.: Stuttering: Improvement Noted when Stutterer Spoke While Walking on all Fours. Science, 1935 (Nov. 29) 82:518.
20. Frankel, Leonard Robert: The Theory of Regression. Jour. Speech Disorders., 1936 (Dec.) p. 107.
21. Kenyon, Elmer N.: Nature and Origin of Stammering. Tr. Am. Laryngol. Assn., 1919, Chicago, pp. 2-13.
22. Kenyon: *Ibid.*, p. 5.
23. Goldthwait, Joel E., *et al*: Body Mechanics. J. B. Lippincott Co., Philadelphia, 1934, p. 154.
24. Kuntz, Albert: The Autonomic Nervous System. Lea and Febiger, Philadelphia, 1934, pp. 210-212.
25. Geniesse: *Op. cit.*, p. 518.
26. Geniesse: *Loc. cit.*
27. Geniesse: *Loc. cit.*
28. Frankel: *Op. cit.*, pp. 107-112.
29. Frankel: *Ibid.*, p. 107.
30. Kenyon: *Op. cit.*, pp. 2-14.
31. Kenyon: *Ibid.*, p. 5.
32. Fairbanks, Grant: Some Correlates of Sound Difficulties in Stuttering. Quart. Jour. Speech, 1937 (Feb.) 23:67-69.
33. Bluemel: *Op. cit.*, p. 66.
34. Kuntz: *Op. cit.*, pp. 500-508.
35. Goldthwait: *Op. cit.*, p. 154.
36. Frankel: *Op. cit.*, p. 111.
37. Frankel: *Ibid.*, pp. 111-112.
38. Kenyon: *Op. cit.*
39. Blanton, Smiley, and Blanton, Margaret Gray: For Stutterers. D. Appleton—Century Co., New York, 1936, pp. 115-116. Bluemel: *Op. cit.*, p. 115.
40. Lindberg, Ralph F.: Personal communication.
41. Brigham, Curtis W.: Case record.
42. Stinchfield: *Op. cit.*, p. 27.
43. Stinchfield: *Ibid.*, p. 134.
44. Bush, Lucius M.: Common Sense Health. Liveright Publishing Corp., New York, 1935, p. 213.
45. Conybeare, J. J., Editor: Textbook of Medicine. Ed. 2. William Wood and Co., New York, 1932, p. 231.
46. Kuntz: *Op. cit.*, p. 145.
47. Kuntz: *Ibid.*, p. 62.
48. Stinchfield: *Op. cit.*, p. 134.
49. Pressman, J. J.: Laryngeal Highlights. (Pamphlet compiled by J. E. Smith from Speech Convention, Ann Arbor, Mich.) Edwards Brothers, Inc., November, 1935.
50. Grant, Samuel B.: Oxford Medicine, Vol. VI, Part 2, 1927 edition, p. 1101, cited by Stinchfield, *op. cit.*, p. 121.
51. Grant: *Loc. cit.*
52. Conybeare: *Op. cit.*, p. 231.
53. Conybeare: *Ibid.*, p. 23.
54. Cecil, Russell L., Editor: A Textbook of Medicine. Ed. 3. W. B. Saunders Co., Philadelphia, 1934, p. 1259.
55. Cecil: *Loc. cit.*
56. Kuntz: *Op. cit.*, pp. 390-401.
57. Holt, W. L.: Loss of Voice, Jour. Am. Osteo. Assn., 1931 (Aug.) 30:502.
58. Gray, Henry: Anatomy of the Human Body. Ed. 22. Lea and Febiger, Philadelphia, 1930, pp. 173-174.
59. Gray: *Ibid.*, pp. 388-391.
60. Erb, R. C.: Personal communication, March 18, 1937.
61. MacBain, R. N.: Personal communication, March 20, 1937.
62. Unpublished manual on osteopathic technic used in Los Angeles College of Osteopathic Physicians and Surgeons, p. 1.
63. Kuntz: *Loc. cit.*
64. Kenyon, Elmer L.: Peripheral Physical Inhibition of Speech. Arch. Otolaryngol., 1930 (Dec.) ?:769-784.
65. Kopp: *Op. cit.*
66. Kuntz: *Op. cit.*, pp. 450-508.
67. Kuntz: *Loc. cit.*
68. Kuntz: *Ibid.*, pp. 376-410.

Prize Essay Contests

All manuscripts entered in the two prize essay contests, one for graduates, one for undergraduates, (see THE JOURNAL for January, 1938, p. 198, for complete details) must be forwarded to Central office *not later than April 15, 1938.*

Don't miss this opportunity, if you are a student, to win a cash prize of $25 for the best essay submitted from your school on the subject of "Essential Hypertension" and perhaps to win the grand prize of $25 additional for the best essay of the six. If you are a graduate student, faculty member, or practicing osteopathic doctor, your essay on "Angina Pectoris with Special Reference to Its Mechanical Causes" may win you the cash prize of $75. All prizes are given by an anonymous donor through the American Osteopathic Association and will be awarded at the A.O.A. convention in Cincinnati.

No length has been set for the paper in the graduate essay contest; 2,000 words is the limit in the undergraduate contest.

The Three Primary Brain Vesicles and the Three Cranial Vertebrae
I. The Three Primary Brain Vesicles

CHARLOTTE WEAVER, D.O.
Akron, Ohio

INTRODUCTION

In the symposium on "The Plastic Basicranium"[1] careful details were given concerning the plastic basicranium: its composition; its intracranial aspect; its intracranially observable apertures, and what passes through them efferently and afferently; the significant peculiarities of the intracranial attachments of the dura to the bony base; the facts that the cranial fossae and the dural sheaths outline configurations which are in consonance with the concept of three, three only, but three complete cephalic segments; the cranial contents, their arterial supply and venous drainage.

Certain other details, pertinent to the etiologic significance of the plastic basicranium, have not been dealt with. The cerebrospinal fluid, and the sympathetic and parasympathetic systems, remain to be discussed. The evolutional meaning of the increasing period of normal plasticity-expectancy of the base in the contemporary American skull is a subject which outside of the Tuesday morning sessions of my Postgraduate Clinic for the Study of Nervous and Mental Diseases has not been publicly mentioned other than in an interview with a press representative of the Sunday *Post*, in Boston, April, 1937. The possible effect upon the progressive evolution of the human species of an insurance of the integrity of the articulations, which bring about that plasticity, during the entire period of the expectancy of the normal plasticity of the base, is a subject which is of vital importance to the osteopathic profession. The direct relation of traumatization of these articulations to the rapid increase of insanity in America, where the per capita increase is greater than in any other country, is another corollary.*

The reading of the present article will be made a more practical effort if preceded by a study of the symposium just referred to, and of two earlier articles by the author.[2,3]

There is one other subject the understanding of which makes the effects to be expected from lesioning of the articulations of the plastic base more readily classifiable, and, therefore, more easily understandable; that subject is the relationship which exists between the morphological development of the three primary brain vesicles and the morphological development of the three cranial vertebrae.

Ranson[4] opens his discussion of the morphology of the brain vesicles as follows:

> At an early stage in the development of any vertebrate embryo the enlarged rostral portion of the neural tube consists of three bulk-like swellings or vesicles, which together represent the brain, and are named from before backward, the prosencephalon or forebrain, mesencephalon or midbrain, and rhombencephalon or hindbrain.† (page 25).

He appends a series of drawings in illustration of the development of the vertebrate brain. Of the first of these drawings, Fig. IA, which accompanies this article, is an adaptation. In this figure, BV1 is the prosencephalon, BV2 the mesencephalon, BV3 the rhombencephalon.

In the composite figure, II, these three original brain vesicles have been superimposed upon the stylized drawing of the skull which has been used earlier in this symposium[5]. This figure of the skull is a suggestive illustration of the three cranial segments. As superimposed upon them, the relationship which exists between the three cephalic neural, or brain, segments and the three osseous, or cranial, segments is recognizable.

According to most commentators, during the ensuant growth of the cephalic portion of the neural tube the prosencephalon becomes outwardly marked off into two portions; the mesencephalon does not; the rhombencephalon does. Hence there is frequently to be found the following tabulation of the early brain elements:

A. Prosencephalon
   - *x* Telencephalon
   - *y* Diencephalon

B. Mesencephalon

C. Rhombencephalon
   - *x* Metencephalon
   - *y* Myelencephalon

This tabulation, but especially this nomenclature, creates a tendency to confuse secondary developmental demarcations with primary brain vesicles, and is, therefore, ambiguous. The three primary brain vesicles are morphological units which are constant throughout the vertebrate phylum, including the human, and are to be interpreted as the segmental compliance of the cephalic neural tube with the segmentation processes of the cephalic paraxial mesoderm and of the cephalic osseous axis, whereas the secondary demarcations of the two of these primary brain vesicles are similar in their developmental significance with the demarcations which become the convolutions of the hemispheres, and the like. The following descriptive tabulation is, therefore, submitted:

Three Original Brain Vesicles, from before backward

A. Prosencephalon
   Two developmental demarcations
   - *x* Telencephalic division of the prosencephalon
   - *y* Diencephalic division of the prosencephalon

B. Mesencephalon

C. Rhombencephalon
   Two developmental demarcations
   - *x* Metencephalic division of the rhombencephalon
   - *y* Myelencephalic division of the rhombencephalon

In his discussion of the further development of the neural tube in the human embryo, Ranson[4] says:

> Except that it is flexed on itself, the brain of the human embryo of five weeks shows a marked resemblance to the diagram of a vertebrate brain without cerebral hemispheres.† (page 30).

*The author plans to discuss these subjects in full in her clinic at a later date.
†Italics in original are not followed herein.

Fig. 1B is a ventrodorsal sagittal outline in the mesial plane of a human embryo of about 13 mm. as taken from an illustration shown by Ranson[5] (page 31) and accredited to His, Sabotta.[12] It is important that the outline *be* in the mesial plane, since were the cut to be made in any lateral plane parallel to the mesial plane the contour would be quite different, because the beginning modifications of the original three brain vesicles take place lateral to the mesial plane and it is therefore only in the mesial sagittal ventrodorsal contour that the continued adherence to the three distinct morphological cephalic portions of the neural tube is incontrovertibly evident in this stage of the embryo.

Figs. IIIA, IIIB, and IVA are in the same mesial sagittal ventrodorsal plane. They were drawn from original dissections made by myself in Paris, France, during 1932. Subsequently I have come upon illustrations accredited to Garrish[6] which are so nearly identical as to make it possibly appear that my own are adapted from his, since his were published as early as 1899. These figures illustrate the adult human brain, and, in serial, show the adult human adherence in the mesial sagittal ventrodorsal plane to the three primary brain vesicles. In Fig. IVB the three brain vesicles have been lifted out of the overhanging and occluding pallium. This illustration is also taken from one of the long series of brain dissections which were done privately by the author in Paris, France, at intervals during the years 1927 to 1933 inclusive. These drawings are schematic. BV1 is the prosencephalon minus the pallia, neo- and archi-; BV2 is the mesencephalon; BV3 is the rhombencephalon. Fig. IC shows the three brain vesicles in relation to the ventral portion of the head end of the human embryo during the branchial arch stage. The interrupted lines indicate the direction of segmentation due to the folding over ventrally of the anterior end of the embryo.

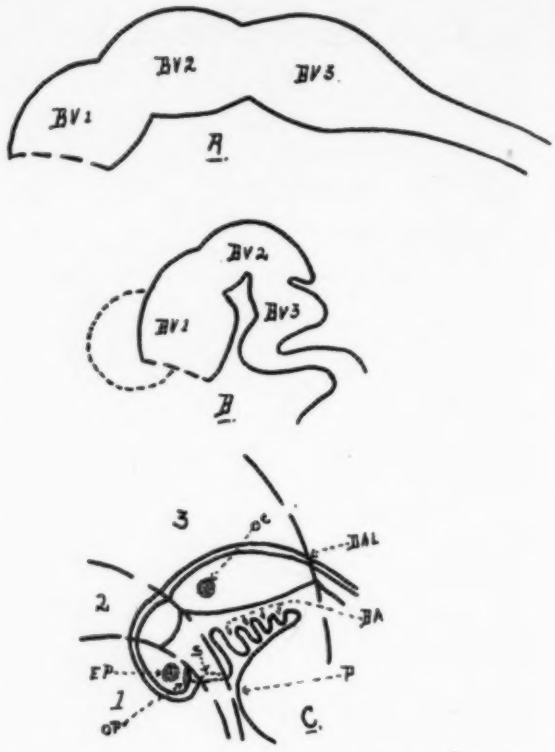


Figure 1.—For explanation of "A" and "B", see text. Legend for "C" is as follows: 1, First cephalic segment. 2, Second cephalic segment. 3, Third cephalic segment. Interrupted lines show direction taken by the segmentation process due to the folding under of the rostral end of the embryo. P, Pericardium. BA, Branchial arches. DAL, End of third cephalic segment; Plane of division between cephalic and precaudal morphological development regions; exists as the level between the third cranial vertebra and the first spinal vertebra. OC, Otocelen in third primary brain vesicle. EP, Eye placode, in first primary brain vesicle. OP, Olfactory placode, in first primary brain vesicle. S, Stomodaeum.

In "The Basicranium"[1] certain of the following points of my thesis were reviewed. Polarization results in the formation of three distinct morphological regions of the developing embryo. These regions I have named the cephalic, the precaudal, and the caudal. These three distinct regions of the polarization of the embryo are dominant, controlling axiation. Segmentation is also dominantly modified by this triregional differentiation of the early embryo. Polarization, axiation and segmentation are three distinct processes. Polarization divides the preaxiated, unsegmented embryo into three regions: head, body, and tail. In the polarization stage the embryo possesses no "segments" and it has no "axis". After the establishment of the three regions, the notochord, growing both cephalad and caudad from the plane in which polarization began (i.e., the site of origin of Hensen's node), axiates the embryo, and in so doing lays down, in itself, the basis of the eventual bony axis of the body.

The notochord is not segmented. Around the notochord the paraxial mesoderm forms[2]. It begins to form in this same plane of the establishment of the polarization process. It proceeds to grow in both directions from here, cephalad and caudad. It proceeds in segments. One segment at a time appears and is then succeeded in each, the cephalic and the precaudal, region by the subsequent appearance of its next more distal neighboring segment. The three morphological polarization regions are not lost in the axiation process; they do not become submerged, nor overshadowed. On the contrary, as axiation, and elongation by means of segmentation, occur this triregionality becomes more strikingly pronounced. Careful study of the osseous axis in the fully evolved current human form shows the existence of these three morphological regions so distinctly that it is impossible longer to disregard the meaning of this fundamental triregional morphological differentiation of the polarization process. The vertebrae of the osseous axis are to be seen in their average state in the precaudal of the three morphological regions, in the adult human; in their state of completest current dedifferentiation in the caudal region; and, approaching the state of their greatest expectancy of differentiation in the cephalic region. The entire contents of the axial canal follow this scheme of cephalad differentiation and caudad dedifferentiation.

Repeatedly throughout the great bulk of related literature is to be found the statement that the neural tube tissues take no part in the general segmentation of the embryo, that segmentation as such is instigated within and is limited to the paraxial mesoderm and its derivatives. This same literature notes the formation of three primary brain vesicles as among the

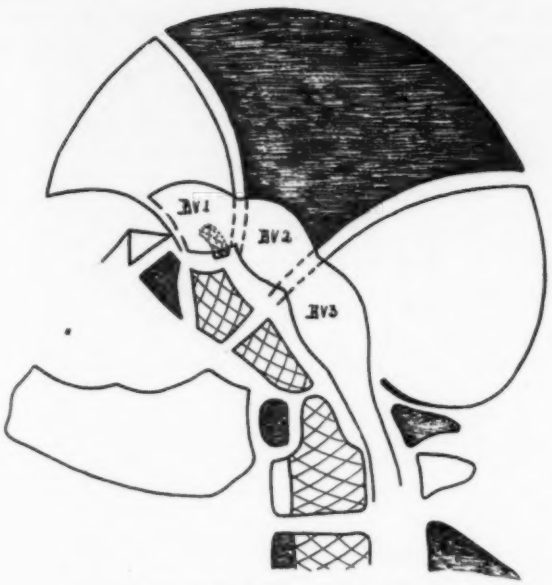


Figure II (See text for explanation).

initial processes of neural tube development. The formation of these three primary brain vesicles coincides with the formation of the so-called occipital somites. (This is about the end of the third week.) Segmentation begins at the base of the third cranial vertebra and proceeds in both directions, caudad and cephalad, from there. Keith[7] says, Segmentation which begins at what will be the occipital region of the head . . .

Certainly effects of the segmentation of the head region into three complete cephalic axial segments are manifested in the cephalic neural tube tissues by the formation of these three primary brain vesicles, as well as in the cephalic osseous tissues by the formation of the three cranial vertebrae.

It is possible that the effects of segmentation in the spinal neural tube tissues are as certainly manifested, but that that manifestation is either so weakly marked or is so uniquely achieved as either to have been overlooked or to have been misunderstood. The existence of spinal neural tube segmental regions of differentiation as related to the nuclei of segmental spinal nerves has been recognized. Perhaps it has been this correlating of neural tube and spinal nerve, segmentally, which has brought about the complete confusion which exists in relation to the head, segmentally. Since there are three distinct morphological divisions in which axiation takes place, and since this triregional axial differentiation preceded segmentation, then it is not unreasonable to expect that segmentation will manifest some remarkable dissimilarities in the three regions. *That segmentation in the head follows the general pattern of segmentation elsewhere, but, that its special manifestations are dissimilar is a logical hypothesis in the light of the facts brought forward.* That there are three, three only, but three complete, cranial vertebrae, we have seen. That there occur three, three only, but three complete so-called "occipital" somites, authenticated literature witnesses. That no "somites" are ever found rostral to these so-called "occipital" somites is also witnessed in authentic literature. That the first indication of the transmutation of the cephalic neural tube into the human adult brain is the formation of three, three only, but three complete, primary brain vesicles is a phenomenon which is scientifically well known. *That there are three, three only, but three complete, cephalic segments is herein contended.*

Figure IIIA Figure IIIB
(See text for explanations.)

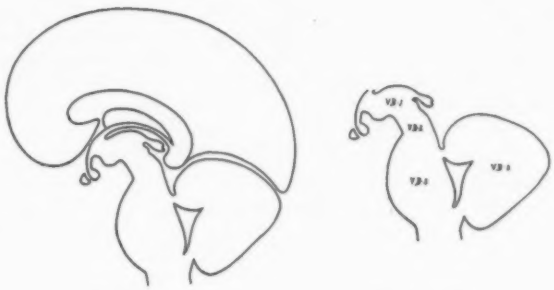


Figure IVA Figure IVB
(See text for explanations.)

DISCUSSION

Chemosynthesis and *Photosynthesis.*—In a certain portion of the written part of my thesis on "A Research Into Certain Heretofore Unexplored Functions of the Central Nervous System," which I presented before the Board of Trustees of the American Osteopathic Association, in July, 1935, at Cleveland, I said: "The energies of nature may, for the purposes of this discussion, be classified as the chemical and the nonchemical. Thus, we can discuss as the chemical energies those energies which have already formed themselves into the chemical elements and their derivatives, or have a tendency so to do; and as nonchemical energies those energies which do not so form themselves into the chemical elements. In the chemical evolutionary stream there are the rays which form themselves into electrons and protons. In the nonchemical evolutionary stream there are the rays which manifest themselves as vibratory rates.

"In the chemical evolutionary stream electrons and protons form themselves into atoms. Atoms form molecules. Molecules form compound molecules. Compound molecules are both inorganic and organic. A combination of certain inorganic and of certain organic molecules form cells. Cells are of two types, plant cells and animal cells. Cells do two things: individually they form biochemical compounds; collectively they form compound cellular organisms. The

plant cell has the power of forming biochemical compounds from the inorganic matter of the earth and of the air, in moisture and sunlight. Animal cells cannot do this. They can take the biochemical compounds which have been formed by plant cells and further fabricate them within their own cellular economy. Certain animal cells cannot even do this. They can but take the biochemical fabrications of other animal cells and still further fabricate them. The human organism is an organism compounded of aggregates of animal cells.[8] The human organism can further fabricate the biochemistry of both plant and animal cells within certain definitely predetermined limits.

"In common with all organisms *the human body is a dynamic mechanism the purpose of which is the reception of certain definite evolutionally prepared energy-forms; the transformation of these received energy-forms into certain, other, definite types of energy-forms which are of a higher evolutional order than are the received forms; the integration into definite potentials of the newly achieved types; and, the subsequent adequate release of the energies so received, so transformed, and so integrated.*[9]

"Those energies which are thus selectively received by the human organism are, (i) certain definite sharply limited, evolutionally prepared chemical compounds, and (ii) certain equally definite and equally sharply limited vibratory rates. Of the chemical compounds, there are those which are found in sea water, those which are found in air, and certain biochemical products of which certain of the fats, carbohydrates, and proteins comprise the total gamut.[10]

"Eddington[11] calls all vibratory rates 'ether waves', and says:

> Ether waves are called by different names according to their wave length. The longest Hertzian waves are used in broadcasting; then come the infra-red heat waves; next come rays of ordinary visible light; then ultra-violet photographic or chemical rays; then x-rays; then Gamma rays emitted by radio-active substances. Probably the shortest of all are the very penetrating radiation found in our atmosphere, which according to the investigations of Kohlhörster and Millikan are believed to reach us from interstellar space. These are all fundamentally the same but correspond to different octaves. The eye is attuned to only one octave, so that most of them are invisible; but essentially they are of the same nature as visible light.

"The table submitted gave the frequencies per second; Eddington speaks of the individual wave lengths. Harvey[12] specifies these lengths as follows:

"Hertzian electric waves (upper limit not reached) above 12 km. to 16 cm.
Unexplored region, .16 cm. to 310 microns.
Infrared, 310 to .76 microns.
Visible light, 7,600 to 4,000 Angström Units.
Ultra violet, 4,000 to 320 Angström Units.
Unexplored region, 320 to 12 Angström Units.
X-rays, 12 to 0.2 Angström Units.
Radium rays, 0.2 Angström Units and shorter‡.

"The human organism thus exhibits two great classes of functions, chemosynthesis and photosynthesis (vibratosynthesis): two great types of reactions: chemotaxis and phototaxis: two great types of release, behavioristic release and vibratory release; behaviorism being secretory and motor release by means of the expressor apparatus, and vibratory release being release of radiant energy.

"*Structure.*—Structure may be defined as related forms placed in continuous relationships with each other in such manner as (i) to insure spatial regulation of those energy-forms which the organism has selectively accepted while they are undergoing their processes of transformation and integration within the organism, and, (ii) to make possible the ultimate controllable release of the transmuted energies. Dr. Andrew Taylor Still's definition of osteopathy was, 'Normal structure in normal juxtaposition means normal function. With especial stress upon the osseous tissues.'[13]"

The manner in which the human organism achieves spatial regulation of its materials is always some unique adaptation of the triregional motif: a region for biochemical compounds, a region for the reception of light, an integrating region: and always, at the place where the integrating region and the region for the reception of vibratory rates meet, there is found to be arising the next evolutional organic transmutation. Throughout the progressive metamorphoses of the structure of forms and their relationships which take place in the phylogenetic development of the organism is to be found this same method of a triadic arrangement of materials, and, of a new metamorphosis arising where light and the integrating center meet.

The materials within the simplest form of the sexually produced organism, the zygote, are so arranged that the yolk granules which are its biochemical "raw materials" lie in the lower portion of the cell, pigment granules fill the upper portion, and in between these two is to be seen a crescentic area which is known as the "grey crescent"[14]. It is along the upper border of the grey crescent and just at the line where the lower margin of the pigmented area and the upper margin of the grey crescent meet that that cell proliferation begins which is to carry the evolution of the organism onward.

The membranous embryo in the primate is trilayered[15], triconcentric. The inner of the three concentric closed sacs is the amniotic sac. The cells of which this is composed are pigmented. The outer sac is the trophoblastic sac. The cells of the trophoblast are phagocytic. They take biochemical materials from the maternal organism. The middle layer is formed between these two.

The demarcation of the embryonal from the extraembryonal area, again, is achieved by a triadic arrangement which differentiates the outer trophoblast, the inner extraembryonal, and the inner embryonal regions. Of these, the embryonal area is the most deeply pigmented. The trophoblast and the extraembryonal areas will eventually slough.

As the bilayered embryonal area becomes demarcated from the extraembryonal area it immediately produces a third, middle, layer autochthonously. The upper layer is pigmented. The lower layer, which was the embryonal portion of the middle of the three layers of the membranous embryo, forms solely those organs which have to do with biochemical and chemical intake and those surfaces which Sherrington[16] calls the introceptive surfaces, i. e., the gastrointestinal,

‡Harvey says, in explanation of this table: "Wave lengths of light are usually given in Angström units. One micron = .001 mm. = 1,000 millimicrons = 10,000 Angström units or tenth meters 10^{-10} meters or 10^{-4} centimeters."

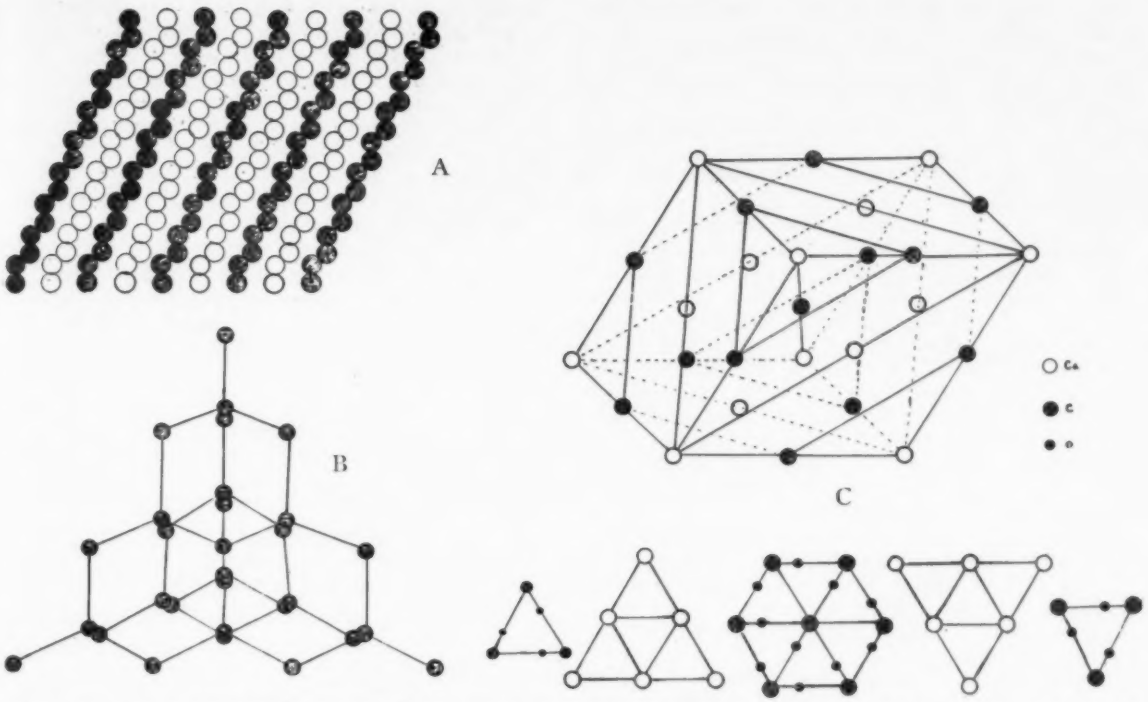


Figure V.—Illustrating "A" stearic acid crystal; "B" crystal of carbon (diamond); "C" crystal of calcium carbonate (iceland spar). Illustrations "A" and "B" adapted by Dr. Roy W. Sanborn, D.O., Akron, Ohio, from Plate 23 B, a diagram stated to be due to A. Muller and credited to the Davy Faraday Laboratories, as shown in "The Universe of Light" by Sir William Henry Bragg.[21] Illustration "C" is adapted from Fig. 82 A and B in the same book.

and the respiratory[16] surfaces. The upper layer forms the central and peripheral nervous systems and the tegmental system.

Polarization divides the embryo into three regions, longitudinally, cephalic, precaudal, and caudal. Of these three regions the cephalic is the most deeply pigmented. The caudal region attenuates and dedifferentiates.

Segmentation divides the cephalic one of the three morphological polarization regions into three primary brain vesicles. Of these three the most rostral is the most deeply pigmented. The preponderantly great proportion of the grey matter of the brain is in the prosencephalon. The most rostral, or first, of the three primary brain vesicles, or the prosencephalon, further fabricates the complexities of the great common archaic photosynthetic functions of the great archaic neural system.** The most caudal, or third of the three primary brain vesicles, or the rhombencephalon, further fabricates the complexities of the great common archaic chemosynthetic functions of the great archaic nutritional system.**

Throughout the entire process of the progressive transmutations of structure by means of which the zygote develops into the mature human organism, the pigmented area is the area which is the vanguard in the forward movement of the evolution of the organism. In each new transient structural achievement the older chemoceptive area sloughs or attenuates and is superceded by a chemoceptive area evolved under the influence of the pigmented area. In each transmutation a new integration of light synthesis and chemosynthesis results. And always there is the complete achievement of each stage by means of the triadic arrangement of materials. Structure is important in the evolution of the organism. Correct interrelations of structural units is important. Morphology is the science of "the study of forms, relations, metamorphoses and phylogenetic development of organs apart from their functions"[17]. The science of osteopathy takes "the study of forms, relations, metamorphoses and phylogenetic development" *and relates this study to the study of function.*

Function. — Anatomically, histologically, intramolecularly, atomically, subatomically, nowhere does the importance of structure lose its profundity. Waters[18] discusses molecular and intramolecular structure as physical aspects of primary importance in organic chemistry. Crowther[19] discusses the "structure of the atom" in one chapter of his "Molecular Physics." Soddy titles a book "The Interpretation of Radium and the Structure of the Atom"[20].

A pigment molecule is a molecule the intramolecular patterning of the component atoms, or atomic groups, of which are such that the arrangement endows the molecule with the power of selecting certain vibratory rates and of rejecting others. Vibratory rates can be integrated, further fabricated, transmuted, so that the resultant form is possessed of a potential which is higher than was the potential of the contributing forms. This happens to vibratory rates in the human organism.

Crystals are molecules which have the power of polarizing light. Their intramolecular patterns are geometric. Crystal formation as a result of the integration of its chemosynthetic and vibratosynthetic functions is the first great phyletic necessity of the animal organism. Upon the integrity of its ability to form successively more evolutionally advanced crys-

**It is planned to deal with these subjects in detail in Part II of this article.

tals depends the future of the phylum. The hemoglobin crystals of the human organism differ from all other hemoglobin crystals. Among the components of lecithin in the human central nervous system is found the stearic acid radical. Fig. V"A" is a stearic acid crystal.[21] The human organism alone produces concretions in its epiphysis.[22] These concretions are not found in idiots and imbeciles. They are usually not found in children before the age of seven. They increase in quantity with age except in senility. In my own cases I have found gross increase in quantity of epiphyseal concretions associated with insanities in which profound exaltation, profound but aberrant mysticism, unalterable claims of "electricity pouring into my head," insistence that "I am in union with all that vibrates," are constant clinical findings; and gross increase in the size of the epiphysis together with from almost complete, to complete, disappearance of the concretions associated with that malady which passes under the name of multiple, or disseminated, sclerosis. These concretions are composed of calcium carbonate and calcium phosphate.[23]

Eddington,[11] in his "Stars and Atoms," tells how an atom of calcium takes on vibrations from the sun. Fig. V"B" is a crystal of carbon (diamond). Fig. V"C" is a crystal of calcium carbonate (iceland spar). Watts[24] says: "The one essential element of the so-called organic compounds is carbon."

The invertebrate skeleton is formed of calcium carbonate. The vertebrate skeleton is formed of calcium phosphate. Beckwith[25] explains in detail how ultraviolet waves are taken on by the sterols of the skin and affect the calcium and phosphorus economy of the body by the formation of vitamin D.

The invertebrate wore his skeleton on the outside of his body.[26] He, thus, could not build himself a calcium phosphate skeleton but had to be content with one of calcium carbonate. He depended upon his outer, calcium, coat to absorb his vibratory rates. The vertebrate builds an endoskeleton. The sterols of his skin select those particular vibratory rates with the aid of which they can fabricate vitamin D. Vitamin D controls the fabrication of calcium phosphate. Calcium phosphate forms the osseous endoskeleton of the vertebrate. The human vertebrate's skin is formed from the upper, pigmented, layer of the trilayered embryo.

In the human vertebrate, the central nervous system develops completely within the endoskeleton, which latter forms of itself a closed cavity which is composed of true osseous tissue. Roentgen rays pass through bone. Visible light rays do not. Ultraviolet and infrared take part in its fabrication. Electricity does pass through it; heat does. Bone will conduct sound. It would seem that bone is a screen specific for the filtering of visible light. That portion of the central nervous system which will be exposed to visible light, namely, the retina, comes to lie completely outside of that closed bony cavity which is the central osseous axis of the human organism. The crystals of the central nervous system are formed of cerebrin.[17] Crystals of cerebrin are found only in those vertebrates that are possessed of a cerebrum.

Under the guidance of light as absorbed and further fabricated by the pigments of the organism the biochemistry of the organism produces, as its primary necessity, crystals of varying patterns; secondarily it produces other, biochemical, forms which are known as granulations[18] which carry on the anabolic and catabolic changes in the body.[18] Upon the perfection of its biochemical granulations depends the quality of its reflex behaviorism. Upon the perfection of the crystals which it forms depends the quality of its radiant emanation, its vibratory release. Upon the ultimate integration of these two depends the ultimate quality of the individual—the conscious, self-selected, intelligently adapted, behavioristic release and the conscious, self-determined, voluntarily controlled release of its radiant energies.

CONCLUSION

Upon the perfection of prosencephalic functioning depend the qualities of the radiant organism. Standing between them and integrating these two is the mesencephalon. Upon the perfection of mesencephalic functioning depends the quality of the individual.

REFERENCES

1. Symposium, "The Plastic Basicranium," constituted the morning program of the 1937 Annual Postgraduate All-Day Meeting of Dr. Charlotte Weaver's Postgraduate Clinic for the Study of Nervous and Mental Diseases, held Sept. 15, 1937, Akron, Ohio. These papers were published as follows:

Naylor, C. L.: Symposium on The Plastic Basicranium. I. The Basicranium. Jour. Am. Osteo. Assn., 1937 (Nov.) 37:94-97.

Sanborn, Earle E.: II. The Intracranium. 1937 (Dec.) 37:137-141.

White, Edwin C.: III. Lesionability of the Basicranium. 1938 (Jan.) 37:183-189.

Ulrich, N. A.: IV. Obstetrical Lesioning of the Base. 1938 (Feb.) 37:248-252.

Weaver, Charlotte: V. Traumatization of the Plastic Basicranium Other Than Obstetrical. 1938 (Mar.) 37:298-303.

2. Weaver, Charlotte: The Cranial Vertebrae. Jour. Am. Osteo. Assn., Part I, 1936 (Mar.) 35:328-336; Part II, 1936 (Apr.) 35:374-379; Part III, 1936 (May) 35:421-424.

3. Weaver, Charlotte: Etiologic Importance of the Cranial Intervertebral Articulations. Jour. Am. Osteo. Assn., 1936 (July) 35:515-525.

4. Ranson, Stephen Walter: The Anatomy of the Nervous System. Ed. 5. W. B. Saunders Co., Philadelphia, 1935.

5. To be seen as Fig. V, p. 97, article by C. L. Naylor, D.O., The Basicranium. Jour. Am. Osteo. Assn., 1937 (Nov.) 37:94-97.

6. Gerrish, Frederick Henry: A Textbook of Anatomy by American Authors. Lea Brothers & Co., Philadelphia, 1899.

7. Keith, Sir Arthur: Human Embryology and Morphology. Ed. 5. William Wood & Co., Baltimore, 1933, p. 50.

8. Macfadyen, Allan: The Cell as a Unit of Life and Other Lectures. Delivered at the Royal Institution, London, 1899-1902. J. & A. Churchill, London, 1908.

9. Weaver, Charlotte: A Consideration of Epilepsy as a Disorder of the Integrative Processes of the Central Nervous System. 1928 (Feb.) 27:445.

10. Starling, Ernest H.: Principles of Human Physiology. Ed. 4. Lea & Febiger, Philadelphia, 1926.

11. Eddington, A. S.: Stars and Atoms. Yale University Press, New Haven, Conn., and Oxford University Press, London, 1928.

12. Harvey, E. N.: Monographs on Experimental Biology. The Nature of Animal Light. J. B. Lippincott Co., Philadelphia, 1920.

13. Still, Andrew Taylor: Definition given verbally to the author on several occasions during the years 1909 to 1912.

14. Jenkinson, J. W.: Vertebrate Embryology. Oxford University Press, Humphrey Milford, London, 1925.

15. Sherrington, Charles S.: Integrative Action of the Nervous System. Yale University Press, New Haven, Conn., 1920.

16. Sajous, Charles E. de M.: Internal Secretions and the Principles of Medicine. Ed. 10. F. A. Davis Co., Philadelphia, 1922.

17. Webster's New International Dictionary. Ed. 2. G. & C. Merriam Co., Springfield, Mass., 1934.

18. Waters, William A.: Physical Aspects of Organic Chemistry. George Routledge & Sons Co., London, 1935.

19. Crowther, James Arnold: Molecular Physics and the Electrical Theory of Matter. Ed. 4. J. & A. Churchill, London, 1927.

20. Soddy, Frederick: The Interpretation of Radium and the Structure of the Atom. G. P. Putnam's Sons, New York, 1922.

21. Bragg, Sir William Henry: The Universe of Light. Macmillan Co., New York, 1933.

22. Flesch, Max: Uber die Deutung der Zirbel bei den Säugetieren, Ant. Anz., Bd. 3, 1888. Quoted by Frederick Tilney and Luther F. Warren in The Morphology and Evolutional Significance of the Pineal Body. Wistar Institute of Anatomy and Biology, Philadelphia, in The American Anatomical Memoirs, No. 9, February, 1919.

23. Piersol's Human Anatomy: Edited by G. Carl Huber. Ed. 9. J. B. Lippincott Co., Philadelphia, 1930.

24. Watts: Quoted by W. A. Tilden in Watts' Manual of Chemistry. Vol II. Chemistry of the Carbon-Compounds: or Organic Chemistry. Ed. 2. P. Blakiston, Son & Co., Philadelphia, 1886.

25. Beckwith, Herman E.: Light. Jour. Am. Osteo. Assn., 1931 (Jan.) 30:224-226.

26. Petrunkevitch, Alexander I.: Morphology of Intervertebrate Types. Macmillan Co., New York, 1931.